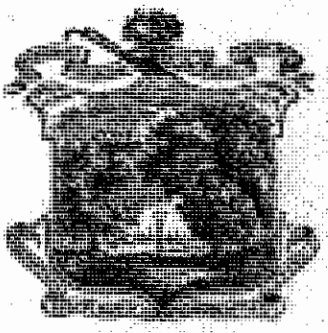
1



Arlington Historic District Commissions

Application for Certificate

(Read attached instructions before completing form)

For Commission Use Only:
Date Rec:
Hearing Date:
Certificate #:
Monitor:

Certificate Requested:

Appropriateness – for work described herein
Minor project Major Project Demolition

Non-Applicability – for the following reason(s):
Not subject to public view
Maintenance, repair, or replacement using same design and materials
Proposed change specifically excluded from review under Bylaw
Other: _____

Hardship – financial or otherwise and does not conflict substantially with the intent and purposes of the Bylaw

General Information:

Property Address 87 Pleasant St. District _____
Owner(s) Ellenhorn LLC Email _____
Owner's Phone (h) _____ (w) 800 515 9972 (fax) _____
Owner's Address 406 Mass Ave Arlington
Applicant (if not Owner) Don Westwater
Applicant's Phone (h) 781 454 9143 (w) same (fax) _____
Applicant's Address 87 Pleasant St. Arlington
Applicant's Relationship to Owner staff

Contractor Tesla Phone 877 7017652
Architect n/a Phone _____

Dates of Anticipated Work: Start early fall **Completion** early fall

Description of Proposed Work: (attach additional pages as necessary) Please include a description of how the proposed work (if a change or addition) is historically and architecturally compatible with the building and the District as a whole.

remove old roof shingles & replace w/ solar tiles

Required Documentation Acknowledgement: (see attached instructions)

I acknowledge that I am required to provide supporting documentation, including the attached "Supporting Documents Checklist", by the deadlines indicated in the instructions. I understand that if such documents are not provided in a timely manner, this application will be considered to be incomplete and Commission action may be delayed.

I have read the attached instructions and, to the best of my knowledge, the information contained in this application is accurate and complete. I also give permission for members of the AHDC to access the property for the purpose of reviewing this application and work done under any certificate issued to me.

~~Owner's~~ Applicant **Signature(s):** _____ **Date:** 7/16/20

2

ARLINGTON HISTORIC DISTRICT APPLICATION
Supporting Documentation Checklist

Property Address 87 Pleasant St. **District** Pleasant St.
Applicant's Name Don Westwater **Email** westwaterdesignbuild@gmail.com
Applicant's Phone (Day) 781 454 9143 **(Mobile)** same

☒ **For Minor Projects or Certificate of Non-Applicability**

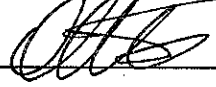
- ☒ **Drawings (11x17 max., with graphic scale, dimensioned, all materials identified) or marked up Photographs (8x10)**
  Existing conditions of historic façade(s) to be modified; Show location of proposed work; Show proposed feature(s); Elevations showing proposed work and context; Drawing showing location of proposed work; Drawing showing the proposed feature(s); Site plan for site located equipment and features
- ☒ **Manufacturer's literature and specifications sheets describing the proposed feature(s)**
- ☒ **Description of how the proposed work is either compatible with the District or Non-Applicable**

☐ **For Major Projects**

- ☐ **Photographs (8x10)**
  Existing conditions of historic structure to be modified (facades, roofs, neighboring buildings); Site; Neighborhood context; Historic precedents for proposed work
- ☐ **Drawings (11x17 max., with graphic scale, must show differentiated existing and proposed conditions, dimensions, and all materials identified)**
  - o ***Plans***
    Site (showing proposed structures, fences, walls, parking, HVAC equipment, electrical equipment, and relationship to adjacent roads, neighboring buildings); Each floor; Roof (showing valleys, hips, ridges, dormers, skylights, chimneys, vents, HVAC equipment, solar panels)
  - o ***Elevations of building facades- identify:***
    Foundation; Siding ; Trim; Gutters; Downspouts; Shutters; Railings; Stairs; Windows; Doors; Roof materials; Roof pitch; Chimneys and vents; Masonry; Light fixtures; Solar panels; HVAC equipment; Electrical equipment; Fences; Signage
  - o ***Wall sections (especially showing projecting features such as bays, balconies, porches, additions)***
  - o ***Relevant exterior detail drawings (architectural trim, eaves, doors, windows, caps, columns, vents, rail systems)***
  - o ***Profile drawings (window and door elements, railings, balusters, stairs, shutters, roof trim, corner boards, casings, water tables, skirts, frieze boards, and all other trim)***
  - o ***For projections, additions and new construction also include:***
    Neighborhood lot plan- include footprint to lot area ratio as well as that of neighboring lots; Plot plan- existing building(s), setbacks, proposed new structures; Site section (show relationship to site topography, adjacent structures, major landscape features, roads)
- ☐ **Manufacturers' literature and specification sheets describing the proposed components**
- ☐ **Suggested Supporting Submittals: Model; Physical Samples**
- ☐ **Description of how the proposed work is compatible with the District.**

☐ **For Demolition**

- ☐ **Statement of current state of existing structure and reason for demolition**
- ☐ **Statement of the historic significance of the structure**
- ☐ **Site Documentation (including Plot plan; Photographs of existing conditions; List existing materials; Year built; Original architect)**
- ☐ **Other provided documentation not described above (please list on a separate attached sheet).**

Applicants Signature(s):  **Date:** 7/16/20
Don Westwater

Description of How Proposed Work on 87 Pleasant St conforms to AHDC Standards

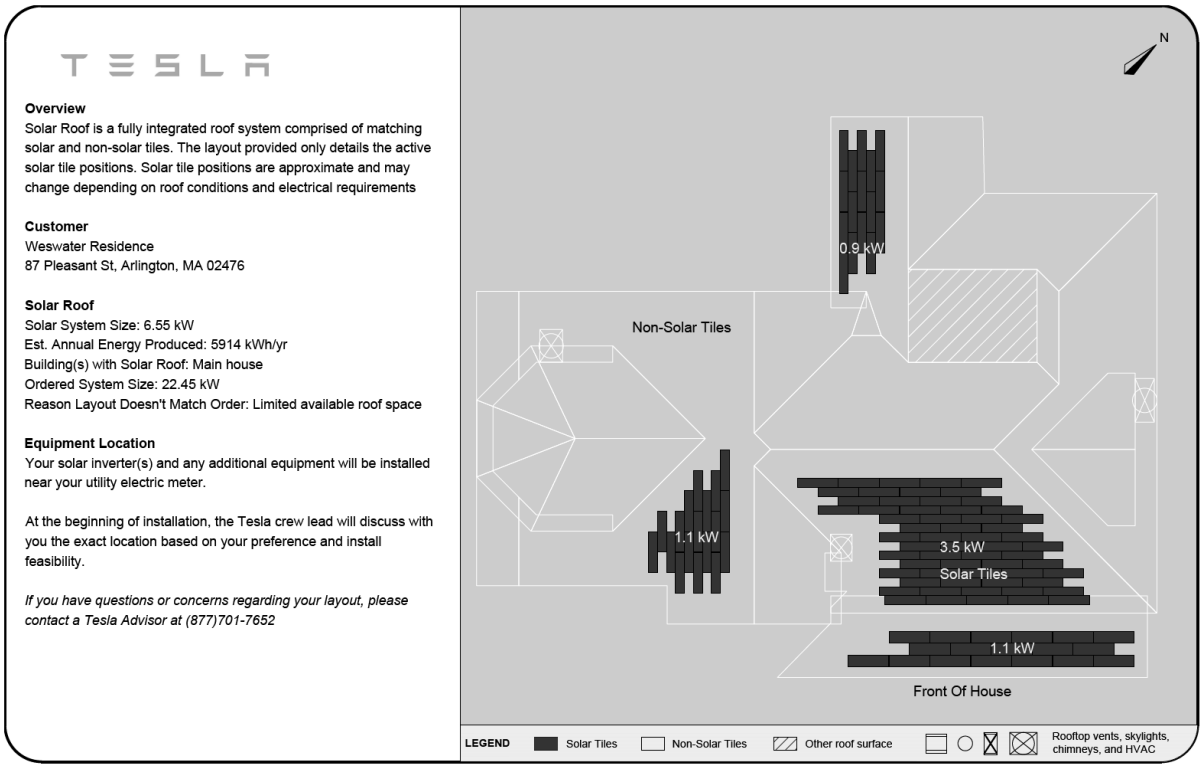
Dear AHDC Board,

The accompanying application and supporting documents requests permission to install black solar tiles on the roof at 87 Pleasant St.

We think that the black roof tiles are consistent with the roofs of the other homes within the Pleasant st. District.

We also hope that the board agrees that the solar roof tiles are preferable to installing a new shingled roof and then mounting solar panels on top of the new roof.

ROOF TILE LAYOUT



4 ABBREVIATIONS

A AMPERE AC ALTERNATING CURRENT BLDG BUILDING CONC CONCRETE DC DIRECT CURRENT EGC EQUIPMENT GROUNDING CONDUCTOR (E) EXISTING EMT ELECTRICAL METALLIC TUBING FSB FIRE SET-BACK GALV GALVANIZED GEC GROUNDING ELECTRODE CONDUCTOR GND GROUND HDG HOT DIPPED GALVANIZED I CURRENT Imp CURRENT AT MAX POWER Isc SHORT CIRCUIT CURRENT kVA KILOVOLT AMPERE kW KILOWATT LBW LOAD BEARING WALL MIN MINIMUM (N) NEW NEUT NEUTRAL NTS NOT TO SCALE OC ON CENTER PL PROPERTY LINE POI POINT OF INTERCONNECTION PV PHOTOVOLTAIC SCH SCHEDULE S STAINLESS STEEL STC STANDARD TESTING CONDITIONS TYP TYPICAL UPS UNINTERRUPTIBLE POWER SUPPLY V VOLT Vmp VOLTAGE AT MAX POWER Voc VOLTAGE AT OPEN CIRCUIT W WATT 3R NEMA 3R, RAINTIGHT

ELECTRICAL NOTES

1. THIS SYSTEM IS GRID-INTERTIED VIA A UL-LISTED POWER-CONDITIONING INVERTER.
2. THIS SYSTEM HAS NO BATTERIES, NO UPS.
3. A NATIONALLY-RECOGNIZED TESTING LABORATORY SHALL LIST ALL EQUIPMENT IN COMPLIANCE WITH ART. 110.3.
4. WHERE ALL TERMINALS OF THE DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION, A SIGN WILL BE PROVIDED WARNING OF THE HAZARDS PER ART. 690.17.
5. EACH UNGROUNDED CONDUCTOR OF THE MULTIWIRE BRANCH CIRCUIT WILL BE IDENTIFIED BY PHASE AND SYSTEM PER ART. 210.5.
6. CIRCUITS OVER 250V TO GROUND SHALL COMPLY WITH ART. 250.97, 250.92(B).
7. DC CONDUCTORS EITHER DO NOT ENTER BUILDING OR ARE RUN IN METALLIC RACEWAYS OR ENCLOSURES TO THE FIRST ACCESSIBLE DC DISCONNECTING MEANS PER ART. 690.31(E).
8. ALL WIRES SHALL BE PROVIDED WITH STRAIN RELIEF AT ALL ENTRY INTO BOXES AS REQUIRED BY UL LISTING.

JURISDICTION NOTES

LICENSE

HIC #168572
ELEC 22812A

AHJ: Arlington

UTILITY: Eversource Energy – South Shore (NSTAR-Commonwealth Electric)

GENERAL NOTES

1. ALL WORK TO BE DONE TO THE 9TH EDITION OF THE MA STATE BUILDING CODE.
2. ALL ELECTRICAL WORK SHALL COMPLY WITH THE 2020 NATIONAL ELECTRIC CODE INCLUDING MASSACHUSETTS AMENDMENTS.

VICINITY MAP

INDEX

REV BY DATE COMMENTS

REV A	NAME	DATE	COMMENTS
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*

JOB NUMBER: JB-0243663 00

MOUNTING SYSTEM: TESLA SOLAR ROOF

MODULES: (112) TESLA # SR60T1

INVERTER: (1) Delta Electronics # M8-TL-US [240V]

CUSTOMER:
Don Westwater
87 Pleasant St
Arlington, MA 02476

7814549143

DESCRIPTION: 6.54864 KW PV ARRAY

*

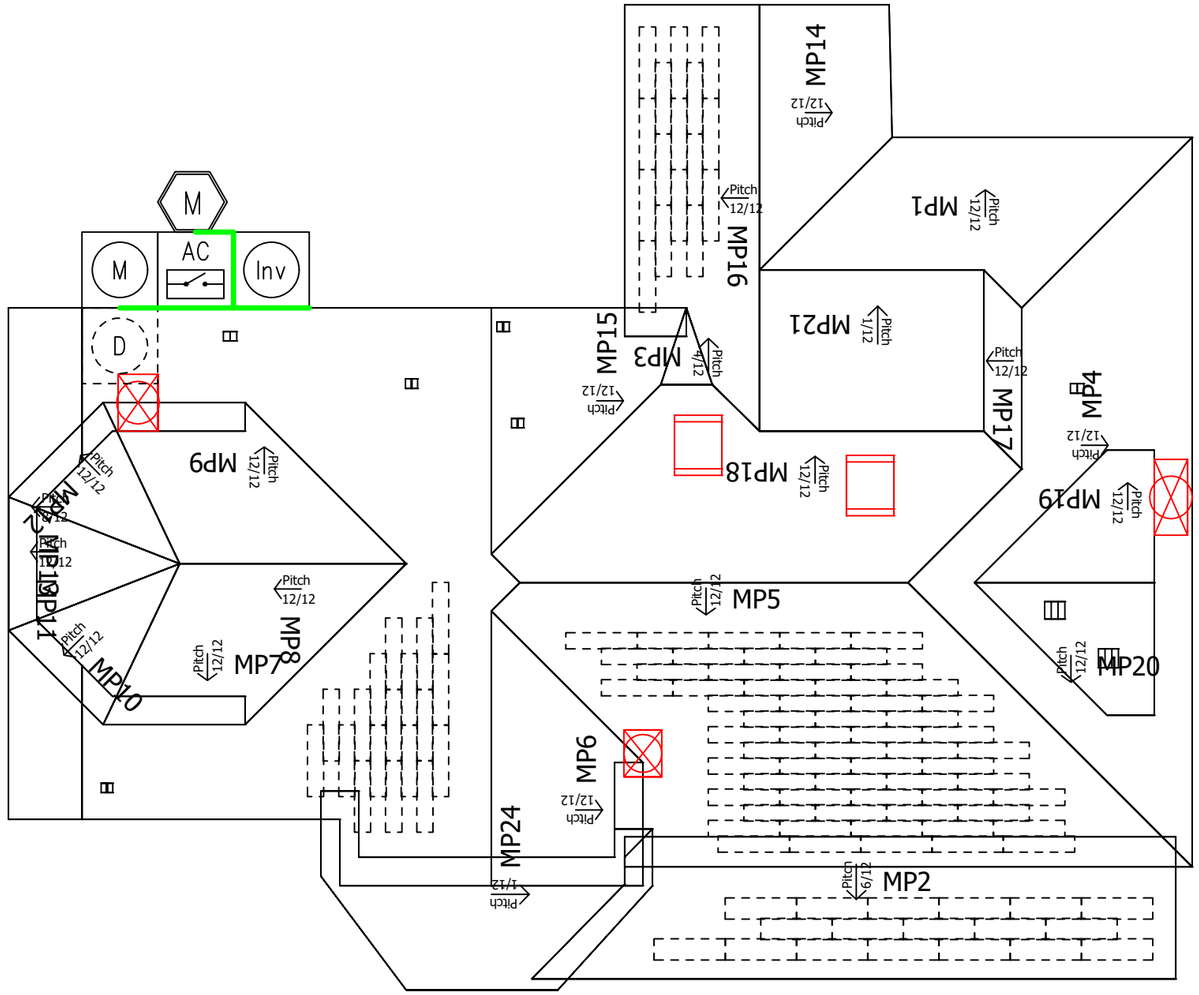
PAGE NAME: COVER SHEET

DESIGN: Bobby Sandoval

SHEET: 1 REV: DATE: 7/12/2020

TESLA

5



MP2	PITCH: 23 AZIMUTH: 132 MATERIAL: Solar Roof	ARRAY PITCH: 23 ARRAY AZIMUTH: 132 STORY: 1 Story
MP5	PITCH: 45 AZIMUTH: 132 MATERIAL: Solar Roof	ARRAY PITCH: 45 ARRAY AZIMUTH: 132 STORY: 2 Stories
MP8	PITCH: 45 AZIMUTH: 222 MATERIAL: Solar Roof	ARRAY PITCH: 45 ARRAY AZIMUTH: 222 STORY: 2 Stories
MP16	PITCH: 45 AZIMUTH: 222 MATERIAL: Solar Roof	ARRAY PITCH: 45 ARRAY AZIMUTH: 222 STORY: 2 Stories

LEGEND

- (M) (E) UTILITY METER & WARNING LABEL
- (Inv) INVERTER W/ INTEGRATED DC DISCO & WARNING LABELS
- (DC) DC DISCONNECT & WARNING LABELS
- (AC) AC DISCONNECT & WARNING LABELS
- (B) DC JUNCTION/COMBINER BOX & LABELS
- (D) DISTRIBUTION PANEL & LABELS
- (LC) LOAD CENTER & WARNING LABELS
- (M) DEDICATED PV SYSTEM METER
- (RSD) RAPID SHUTDOWN
- STANDOFF LOCATIONS
- CONDUIT RUN ON EXTERIOR
- CONDUIT RUN ON INTERIOR
- GATE/FENCE
- HEAT PRODUCING VENTS ARE RED
- INTERIOR EQUIPMENT IS DASHED

SITE PLAN

Scale: 3/32" = 1'

0 1' 10' 21'

JOB NUMBER: JB–0243663 00

MOUNTING SYSTEM: TESLA SOLAR ROOF

MODULES: (112) TESLA # SR60T1

INVERTER: (1) Delta Electronics # M8–TL–US [240V]

CUSTOMER:
Don Westwater
87 Pleasant St
Arlington, MA 02476

7814549143

DESCRIPTION: 6.54864 KW PV ARRAY

*

PAGE NAME: SITE PLAN

DESIGN: Bobby Sandoval

SHEET: 2 REV: DATE: 7/12/2020

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6

GROUND SPECS	MAIN PANEL SPECS	GENERAL NOTES	INVERTER SPECS	MODULE SPECS	LICENSE
BOND (N) #6 GEC TO TWO (N) GROUND RODS AT PANEL WITH IRREVERSIBLE CRIMP	Panel Number: NoLabel Meter Number: 1835659 Underground Service Entrance	Inv 1: DC Ungrounded	INV 1 — (1) Delta Electronics # M8-TL-US [240V] Inverter; 7680W, 240V/208V, 97.5%, Zigbee INV 2 INV 3	— (12) Tesla # SR60T1 Solar Roof PV Module; 58.47W, 52.11W PTC, Textured Voc: 13.34 Vpmax: 10.99 Isc AND Imp ARE SHOWN IN THE DC STRINGS IDENTIFIER	HIC #168572 ELEC 22812A

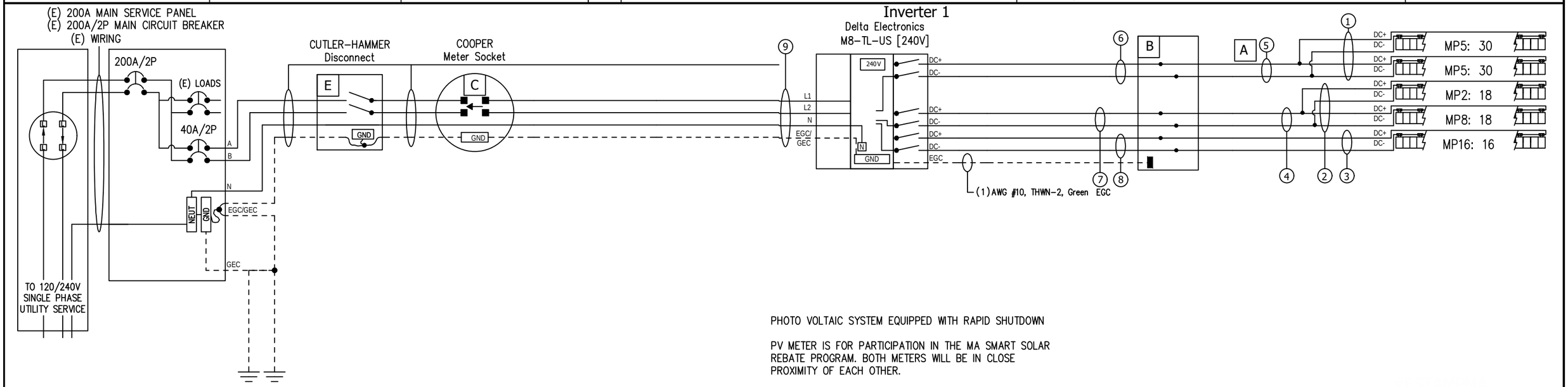


PHOTO VOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

PV METER IS FOR PARTICIPATION IN THE MA SMART SOLAR REBATE PROGRAM. BOTH METERS WILL BE IN CLOSE PROXIMITY OF EACH OTHER.

DC Conduit Reference Chart		
Qty Conductors	Raceway if THWN-2	Raceway if PV Wire
<=(5) AWG #10	3/4" EMT or LFMC	3/4" EMT or LFMC
<=(7) AWG #10		1" EMT or LFMC
<=(9) AWG #10		1-1/4" EMT or LFMC

Voc* = MAX VOC AT MIN TEMP

POI
- (1) MURRAY # MP240 PV BACKFEED BREAKER Breaker; 40A/2P, 2 Spaces
- (2) Ground Rod 5/8" x 8', Copper

AC

E
- (1) CUTLER-HAMMER # DG222URB Disconnect; 60A, 240Vac, Non-Fusible, NEMA 3R
- (1) CUTLER-HAMMER # DG100NB Ground/Neutral Kit; 60-100A, General Duty (DG)

C
- (1) COOPER # B-Line Meter Socket 011 Meter Socket; 125A, 4-14AWG, Ring Type
- (1) AW CAP; B-Line Meter Socket Accessory
- (1) COOPER # B-LINE 25162 CLEAR PLASTIC METER SOCKET COVER

B
- (4) Junction Box Metal; 6"x6"x4", Box w/ cover; Nema 1

DC

PV
- (9) Delta # GPI00010114 MCI Rapid Shutdown, 600V, 12A, NEMA 4X, MC4, for Solar Roof

A
- (2) MULTI-CONTACT PV-AZB4 32.0018; Branch Socket; MC4 U-Joint Connector, Female
- (2) MULTI-CONTACT PV-AZS4 32.0019; Branch Plug; MC4 U-Joint Connector, Male

PTB
- (4) 1145820-00-R PASS THROUGH BOX, TWO STRING, REWORKED

9	10ft	(1) AWG #8, THWN-2, Black (1) AWG #8, THWN-2, Red (1) AWG #10, THWN-2, White (1) AWG #8, THWN-2, Green	Vmp = 240 VAC Imp= 32 AAC (1) Conduit Kit; 1" EMT		
6	50ft	(1) AWG #10, THWN-2, Black (1) AWG #10, THWN-2, Red	Voc* = 472.43 VDC Isc = 11.3 ADC Vmp = 329.70 VDC Imp= 10.64 ADC	5 (2) AWG #10, PV Wire, 600V, Black	Voc* = 472.43 VDC Isc = 11.3 ADC Vmp = 329.70 VDC Imp= 10.64 ADC
7	50ft	(1) AWG #10, THWN-2, Black (1) AWG #10, THWN-2, Red	Voc* = 283.46 VDC Isc = 11.3 ADC Vmp = 197.82 VDC Imp= 10.64 ADC	4 (2) AWG #10, PV Wire, 600V, Black	Voc* = 283.46 VDC Isc = 11.3 ADC Vmp = 197.82 VDC Imp= 10.64 ADC
8	50ft	(1) AWG #10, THWN-2, Black (1) AWG #10, THWN-2, Red	Voc* = 251.96 VDC Isc = 5.65 ADC Vmp = 175.84 VDC Imp= 5.32 ADC		
1				(4) AWG #10, PV Wire, 600V, Black	Voc* = 472.43 VDC Isc = 5.65 ADC Vmp = 329.70 VDC Imp= 5.32 ADC
2				(4) AWG #10, PV Wire, 600V, Black	Voc* = 283.46 VDC Isc = 5.65 ADC Vmp = 197.82 VDC Imp= 5.32 ADC
3				(2) AWG #10, PV Wire, 600V, Black	Voc* = 251.96 VDC Isc = 5.65 ADC Vmp = 175.84 VDC Imp= 5.32 ADC

JOB NUMBER: JB-0243663 00

MOUNTING SYSTEM: TESLA SOLAR ROOF

MODULES: (112) TESLA # SR60T1

INVERTER: (1) Delta Electronics # M8-TL-US [240V]

CUSTOMER:
Don Westwater
87 Pleasant St
Arlington, MA 02476

7814549143

DESCRIPTION:
6.54864 KW PV ARRAY

*

PAGE NAME: THREE LINE DIAGRAM

DESIGN: Bobby Sandoval

SHEET: 3 REV: DATE: 7/12/2020

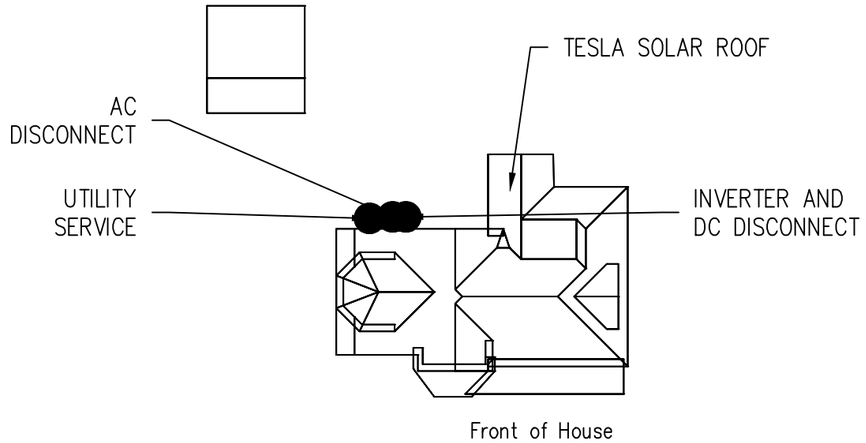
TESLA

7

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN ARRAY

Address: 87 Pleasant St



OPERATING VOLTAGE = 240 JB-0243663-00

Note: Used on Delta String Inverters
Yellow background on top, white background on bottom all black text and images

JOB NUMBER: JB–0243663 00
MOUNTING SYSTEM: TESLA SOLAR ROOF
MODULES: (112) TESLA # SR60T1
INVERTER: (1) Delta Electronics # M8–TL–US [240V]

CUSTOMER:
Don Westwater
87 Pleasant St
Arlington, MA 02476

7814549143

DESCRIPTION:
6.54864 KW PV ARRAY

*

PAGE NAME:
SITE PLAN PLACARD

DESIGN:
Bobby Sandoval

SHEET: 4 REV: DATE: 7/12/2020

TESLA

8

JOB NUMBER: JB–0243663 00

MOUNTING SYSTEM: TESLA SOLAR ROOF

MODULES: (112) TESLA # SR60T1

INVERTER: (1) Delta Electronics # M8–TL–US [240V]

CUSTOMER:
Don Westwater
87 Pleasant St
Arlington, MA 02476

7814549143

DESCRIPTION:
6.54864 KW PV ARRAY

*

PAGE NAME: CONDUIT RUN

DESIGN: Bobby Sandoval

SHEET: 5 REV: DATE: 7/12/2020

TESLA

WARNING: PHOTOVOLTAIC POWER SOURCE

Label Location:
(C)(CB)(JB)
Per Code:
NEC 690.31.G.3

PHOTOVOLTAIC DC DISCONNECT

Label Location:
(DC) (INV)
Per Code:
NEC 690.13.B

MAXIMUM VOLTAGE
MAXIMUM CIRCUIT CURRENT
MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER (IF INSTALLED)

Label Location:
(DC) (INV)
Per Code:
NEC 690.53

WARNING
ELECTRIC SHOCK HAZARD
IF A GROUND FAULT IS INDICATED
NORMALLY GROUNDED
CONDUCTORS MAY BE
UNGROUNDED AND ENERGIZED

Label Location:
(DC) (INV)
Per Code:
690.41.B

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION
DC VOLTAGE IS
ALWAYS PRESENT WHEN
SOLAR MODULES ARE
EXPOSED TO SUNLIGHT

Label Location:
(DC) (CB)
Per Code:
CEC 690.13.B

PHOTOVOLTAIC AC DISCONNECT

Label Location:
(AC) (POI)
Per Code:
NEC 690.13.B

MAXIMUM AC OPERATING CURRENT A
MAXIMUM AC OPERATING VOLTAGE V

Label Location:
(AC) (POI)
Per Code:
NEC 690.54

WARNING
ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION

Label Location:
(AC)(POI)
Per Code:
NEC 690.13.B

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

Label Location:
(INV)
Per Code:
NEC 690.56.C.3

WARNING
INVERTER OUTPUT
CONNECTION
DO NOT RELOCATE
THIS OVERCURRENT
DEVICE

Label Location:
(POI)
Per Code:
NEC 705.12.B.2.3.b

CAUTION
PHOTOVOLTAIC SYSTEM
CIRCUIT IS BACKFED

Label Location:
(D) (POI)
Per Code:
NEC 690.64.B.4

CAUTION
DUAL POWER SOURCE
SECOND SOURCE IS
PHOTOVOLTAIC SYSTEM

Label Location:
(POI)
Per Code:
NEC 705.12.B.3

PHOTOVOLTAIC POINT OF INTERCONNECTION
WARNING: ELECTRIC SHOCK HAZARD. DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDE MAY BE ENERGIZED IN THE OPEN POSITION. FOR SERVICE DE-ENERGIZE BOTH SOURCE AND MAIN BREAKER.
PV POWER SOURCE
MAXIMUM AC OPERATING CURRENT A
MAXIMUM AC OPERATING VOLTAGE V

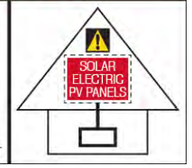
Label Location:
(POI)
Per Code:
CEC 690.13.B

WARNING
ELECTRIC SHOCK HAZARD
THE DC CONDUCTORS OF THIS
PHOTOVOLTAIC SYSTEM ARE
UNGROUNDED AND
MAY BE ENERGIZED

Label Location:
(DC) (INV)

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

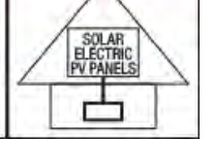
TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN CONDUCTORS OUTSIDE THE ARRAY. CONDUCTORS WITHIN THE ARRAY REMAIN ENERGIZED IN SUNLIGHT



Label Location:
ABB/Delta Solivia Inverter
Per Code:
690.56(C)(1)(b)

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY.



Label Location:
SolarEdge/Delta M-Series Inverter
Per Code:
690.56(C)(1)(a)

(AC): AC Disconnect
(C): Conduit
(CB): Combiner Box
(D): Distribution Panel
(DC): DC Disconnect
(IC): Interior Run Conduit
(INV): Inverter With Integrated DC Disconnect
(LC): Load Center
(M): Utility Meter
(POI): Point of Interconnection

10

TESLA

SOLAR ROOF

DATASHEET

ROOFING SYSTEM SPECIFICATIONS

CERTIFICATIONS

UL Listed	ETL Listed
UL 61730	UL 790 Class A
UL 9703	TAS100
UL 1741	ASTM D3161 Class F

ELECTRICAL CHARACTERISTICS

Maximum open circuit voltage rating of connected branch circuits per diode (at STC): 13.34 V
Maximum series fuse rating: 10 A
Maximum system voltage: 600 V

ROOF PITCH RANGE

2:12 - 20:12

MODULE SPECIFICATIONS

MODEL #SR60T1 14-CELL MODULE

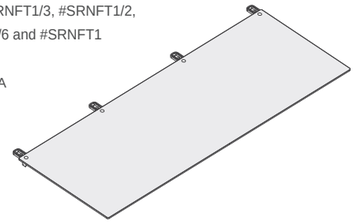
Irradiance (W/m^2)	Temp. (Celsius)	Voc (V)	Vmp (V)	Isc (A)	Imp (A)	Pmax (W)
1000	25	13.34	10.99	5.65	5.32	58.47

These electrical characteristics are within ± 5% of the indicated values of Isc, Voc, and Pmax under standard test conditions (irradiance of 1000 W/m^2, AM 1.5 spectrum, and a cell temperature of 25 °C or 77 °F).

Dimensions	430 mm x 1140 mm Appx. 5 mm module thickness with 35.3 mm maximum height from deck
Principal Materials	Glass, Polymers, Fiberglass and Silicon
Installed System Weight	Textured Glass: 16.4 kg/m² or 3.4 psf Installed weights include all components of system above roof sheathing

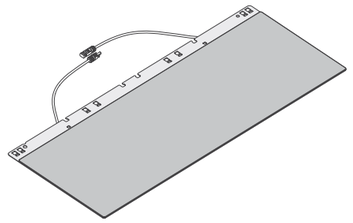
ROOFING MODULES, FULL AND PARTIAL

Model #SRNFT1/6, #SRNFT1/3, #SRNFT1/2,
#SRNFT2/3, #SRNFT5/6 and #SRNFT1
Listed to UL 61730
Listed to UL 790 Class A
ASTM D3161 Class F
TAS100



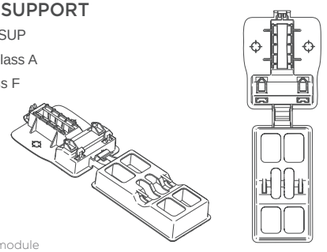
PV MODULE

Model #SR60T1
Listed to UL 61730
UL 790 Class A
ASTM D3161 Class F
TAS100



FOOT WITH SUPPORT

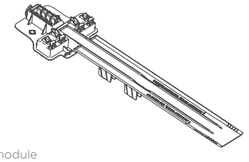
Model #SR-FOOTSUP
Listed to UL 790 Class A
ASTM D3161 Class F
TAS100



Center foot for PV module

FOOTLAP

Model #SR-FOOTLAP
Listed to UL 790 Class A
ASTM D3161 Class F
TAS100



Edge foot for PV module

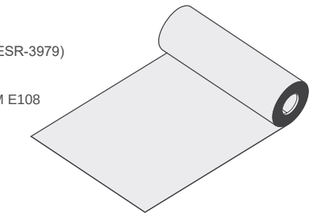
MCI RAPID SHUTDOWN

Model #EE-002605-003, Delta #GPI00010110
600V, 12A, NEMA 4X, MC4

Listed to UL 1741 PVRSE

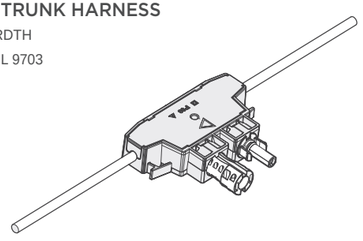
FIRESTONE UNDERLAYMENT

Clad-Gard SA FR
ASTM D226 Type I & II
Certified to ICC-ES AC188 (ESR-3979)
and ASTM D1970
Class A Fire Rated per ASTM E108



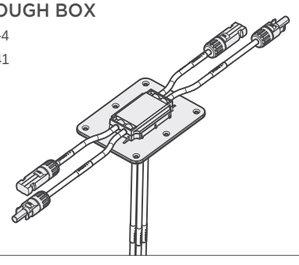
DIODE TRUNK HARNESS

Model #SRDTH
Listed to UL 9703



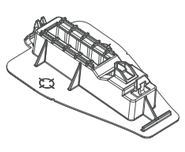
PASS THROUGH BOX

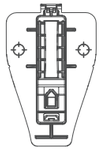
Model #SRPTB-4
Listed to UL 1741



ROOFING FOOT

Model #SR-FOOT

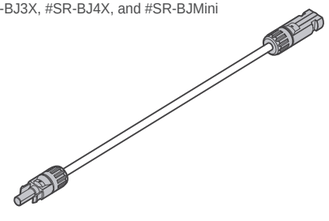




Center foot for Roofing module

BRANCH JUMPER

Model #SR-BJ2X, #SR-BJ3X, #SR-BJ4X, and #SR-BJMini
Listed to UL 9703



Single Phase Solar Inverter for North America

M4-TL-US | M5-TL-US | M6-TL-US | M8-TL-US | M10-TL-US | M10-4-TL-US

Key Features:

- Smart inverter with BLE, optional WiFi, Ethernet, 3G / 4G cellular communication
- Optional revenue grade meter (compliant with ANSI C12.20, Class 0.5)
- Support bi-directional cloud communication
- Support remote diagnosis and OTA
- Type 4 protection
- Built-in AFCI & Rapid shutdown controller
- CEC efficiency 97.5%
- UL 1741 SA, HECO compliant
- CA Rule 21 Phase 1 & 2 & 3 compliant

Model	M4-TL-US	M5-TL-US	M6-TL-US	M8-TL-US	M10-TL-US	M10-4-TL-US
INPUT (DC)						
Max. system voltage	600 V					
Nominal voltage	380 V					
Max. operating voltage	540 V					
Operating MPPT voltage range	50 V to 480 V					
Max. input current per MPPT	12 A	12 A	12 A	12 A	20 A	10 A
Max. short circuit current per MPPT	15 A	15 A	15 A	15 A	30 A	15 A
Max. DC/AC ratio	1.3					
DC disconnect	Integrated					
MPP tracker	2	2	3	3	2	4
Input strings available	2 - 2	2 - 2	2 - 2 - 2	2 - 2 - 2	2 - 2	2 - 2 - 2 - 2
OUTPUT (AC)						
Nominal output power @ 240Vac	3840 W	4800 W	5760 W	7680 W	9600 W	9600 W
Max. output power @ 240Vac	4000 W	5000 W	6000 W	8000 W	10000 W	10000 W
Nominal output power @ 208Vac	3328 W	4160 W	4992 W	6656 W	8320 W	8320 W
Max. output power @ 208Vac	3648 W	4560 W	5472 W	7296 W	9120 W	9120 W
AC operating voltage range	183 Vac to 228 Vac @ 208 Vac 211 Vac to 264 Vac @ 240 Vac					
Max. continuous current	16 A	20 A	24 A	32 A	40 A	40 A
Nominal operating frequency	60 Hz					
Operating frequency range	59.3 Hz to 60.5 Hz					
Adjustable frequency range	50 Hz to 66 Hz					
Night consumption	< 1.5 W [1)]					
THD @ nominal power	< 3 %					
Power factor @ nominal power	> 0.99					
Adjustable power factor range	0.85i to 0.85c					
GENERAL SPECIFICATION						
Max. efficiency	98%					
CEC efficiency	97.0 % @ 208 V 97.5 % @ 240 V	97.5 % @ 208 V 97.5 % @ 240 V	97.0 % @ 208 V 97.5 % @ 240 V	97.5 % @ 208 V 97.5 % @ 240 V	97.5 % @ 208 V 97.5 % @ 240 V	97.0 % @ 208 V 97.5 % @ 240 V
Operating temperature range	-22 °F to 149 °F (-30 °C to 65 °C) with derating above 113 °F (45 °C)					
Storage temperature range	-40 °F to 185 °F (-40 °C to 85 °C)					
Humidity	0% to 95%					
Max. operating altitude	9,843 ft (3,000 m)					
Acoustic noise	< 45 dB(A) @ 3 ft (1m)					

Solar Inverter for North America

Model	M4-TL-US	M5-TL-US	M6-TL-US	M8-TL-US	M10-TL-US	M10-4-TL-US
MECHANICAL DESIGN						
Dimensions (W x H x D)	16.7 x 23.2 x 5.9 in (425 x 590 x 150 mm)					
Display	LED indicators					
Weight [2]	41.9 lbs (19.0 kg)	41.9 lbs (19.0 kg)	44.3 lbs (20.1 kg)	45.2 lbs (20.5 kg)	47.6 lbs (21.6 kg)	47.6 lbs (21.6 kg)
Cooling	Natural convection			Natural convection with internal fan		
DC connection	Spring contact type					
AC connection	Spring contact type					
Rapid Shutdown Initiation Method	Loss of AC or DC Disconnect					
Communication interface	BLE, optional WiFi, Ethernet, 3G / 4G cellular communication					
Enclosure material	Die-casting aluminum					
STANDARDS						
Enclosure protection rating	Type 4					
Safety	UL 1741, CSA-C22.2 No. 107.1-01					
Software approval	UL 1998					
Ground fault protection	UL 1741 CRD					
Anti-islanding protection	IEEE 1547, IEEE 1547.1					
EMC	FCC part 15 Class B					
AFCI	UL 1699B (Type 1), NEC 2017 Article 690.11					
Rapid shutdown protection	NEC 2017 690.12 [3]					
Integrated meter	ANSI C12.20, Class 0.5					
Grid support regulation	UL 1741 SA, California Rule 21 phase 1 & 2 & 3, HECO Compliant					
WARRANTY						
Standard warranty	10 years					

1) Without consumption of communication card
2) Without weight of revenue grade meter
3) Compliant with Tigo rapid shutdown system or APS rapid shutdown system

Delta Electronics (Americas), Ltd.
46101 Fremont Blvd, Fremont, CA 94538
Sales Email: Inverter.Sales@deltaww.com
Support Email: Inverter.Support@deltaww.com
Sales Hotline: +1-877-440-5851 or +1-626-369-8021
Support Hotline: +1-877-442-4832
Support (Intl.): +1-626-369-8019
Monday to Friday from 6am to 6pm PST (apart from Holidays)
www.Delta-Americas.com

Accessory: MCI (Middle Circuit Interrupter)

Features:

- Automatic function test upon startup, ensure safety
- Enclosure protection Type 4
- Meet 2017 NEC Article 690.12 Rapid Shutdown
- No installation needed for every PV Module, make better cost performance for PV system
- With PLC, no additional cable needed

INPUT RATINGS		
Delta part number	GPI00010110	GPI00010114
Maximum system voltage	600 Vdc	
Rated input operating voltage	6 Vdc to 80 Vdc	
Number of input circuit	1	
Startup voltage	22 V	
Rated input current	12 A	
OUTPUT RATINGS		
Rated output current	12 A	
Control signal method	PLC signal	
GENERAL DATA		
Dimensions (W x H x D)	4.6 x 6.5 x 3.0 in (117 x 165 x 76.5 mm) (without cable)	3.8 x 6.5 x 1.1 in (97.3 x 165 x 27.3 mm) (without cable)
Weight	2.0 lbs (0.9 kg)	1.4 lbs (0.64 kg)
Bracket	Groove adapter bracket	Without
Cooling	Natural convection	
DC input / output connectors	MC4 PV connector	
Cable length with connector	Input : 5.9 in (150 mm) Output: 47.2 in(1200 mm)	Input : 5.9 in (150 mm) Output : 12 in (305 mm)
Enclosure material	Plastic	
Operating temperature	-40 °F to 185 °F (-40 °C to 85 °C)	
Storage temperature	-40 °F to 185 °F (-40 °C to 85 °C)	
Humidity	0% to 95%	
Maximum operating altitude	9,843 ft (3,000 m) above sea level	
Self power consumption	<3.0 W	
Warranty	10 years	
STANDARD COMPLIANCE		
Enclosure protection rating	Type 4 / IP67	
Safety	UL 1741, CSA C22.2 No. 330-17	
Rapid shutdown	NEC 2017 Article 690.12	
EMC	FCC Part 15 Class B	

PVRSA Model: Solarglass Roof Rapid Shutdown Array

Category QIJR, Report Date: 2020-05-01

TABLE OF ESSENTIAL ELEMENTS

Function	Manufacturer	Model No.	Firmware Versions and Checksums	Certification Standard
PVRSE Mid Circuit Interrupter (MCI)	Delta Electronics	GPI00010114 [2]	2.1.6	UL 1741 PVRSE
Inverter	Delta Electronics	M4, M5, M6, M8, M10	Sys: 2.2.11 Pwr: 1.4.9 Safety: 1.4.3	UL 1741
PV Module	Tesla	SR60T1	N/A	UL 61730
Diode Harness	Tesla	SRDTH	N/A	UL 9703
PV Wire Jumper(s)	Tesla	SR-BJ2X, SR-BJ3X, SR-BJ4X, SR-BJMini	N/A	UL 9703
Pass-Through Box	Tesla	SRPTB-4	N/A	UL 1741
PVRSA Initiator [1] (See installation req. below)	Non-Specific	N/A	N/A	N/A

1 Dedicated PV system AC circuit breaker or AC disconnect switch, labeled per NEC 690.12 requirements.

2 Applies to variations of this part number, e.g. suffixes.

Note: PVRSA installation requirements may reduce the effective equipment and component ratings below the individual equipment and component PVRSE ratings in order to achieve PVRSA shock hazard reduction requirements.

PVRSA INSTALLATION REQUIREMENTS

Max System Voltage	600 VDC
Max Array Internal Voltage After Actuation	165 VDC (cold weather open circuit)
Max Series-Connected Panels between MCI Output Connections:	10
Max Series-Connected Panels Connected to MCI Inputs:	5

OTHER INSTALLATION INSTRUCTIONS

1. MCIs shall be positioned at a slight angle during installation on roof deck to assist with water shedding.

2. An MCI must be connected to one end of each series string or mounting plane sub-array string.

3. Verification that MCIs are installed with 10 or fewer modules between MCI output connections shall be documented for inspection, by voltage measurement logs and/or as-built string layout diagrams.

4. The dedicated PV system AC circuit breaker or PV system AC disconnect switch shall serve as the PVRSA initiator and shall be sized and installed in accordance with NEC requirements. The specific part shall be identified on the as-built system drawings.

UL CERTIFIED SAFETY US E515336

Certification Mark of UL on the installation instructions is the only method provided by UL to identify products manufactured under its Certification and Follow-Up Service. The Certification Mark for these products includes the UL symbol, the words "CERTIFIED" and "SAFETY", the geographic identifier(s), and a file number.

87 Pleasant Historical Application

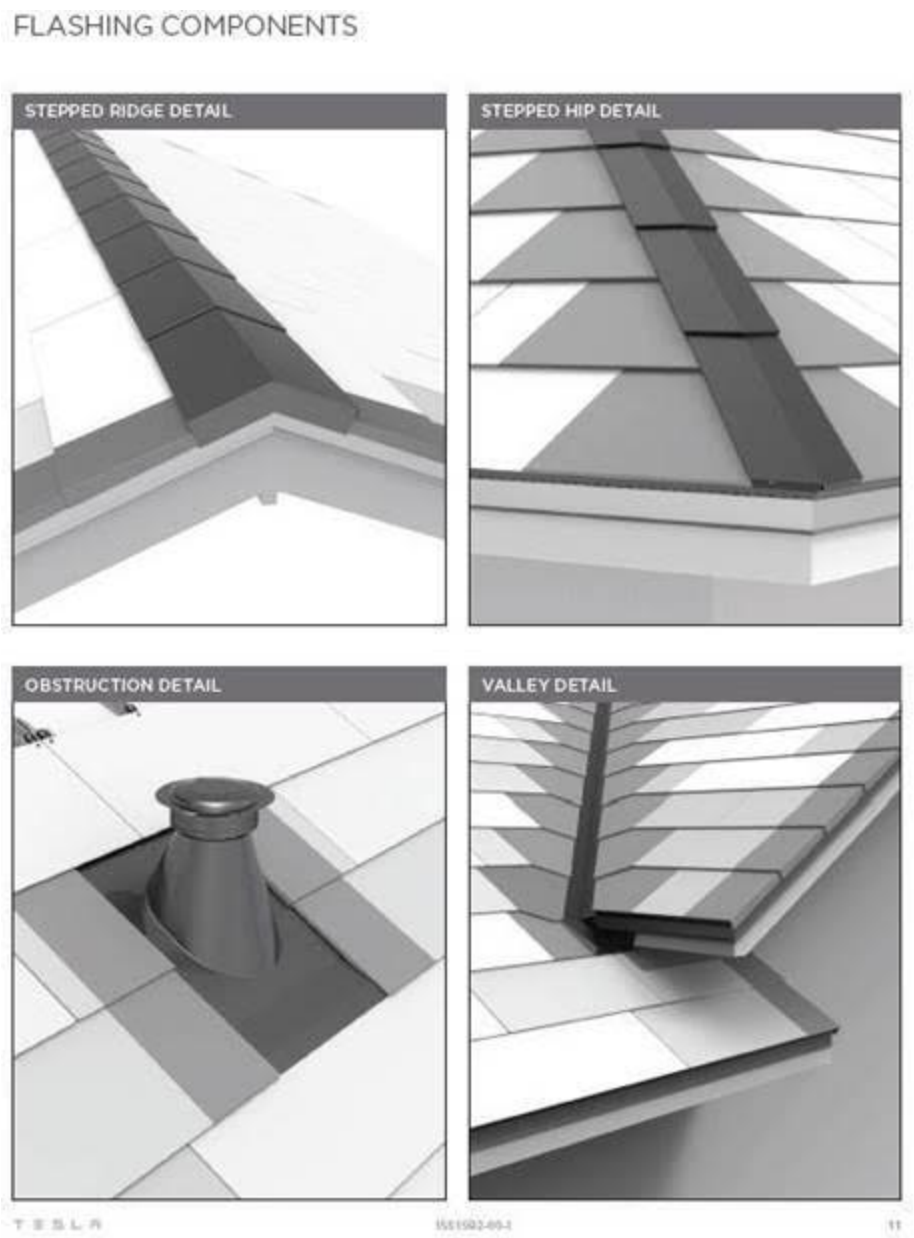
1 message

Lynelle Mastromarino <lmastromarino@tesla.com> Fri, Aug 28, 2020 at 11:34 AM
To: "ahdc@town.arlington.ma.us" <ahdc@town.arlington.ma.us>
Cc: Carol Greeley <carol.greeley@gmail.com>

Good morning,

I've attached imagery at request of the historical commission for the Solar Roof application for 87 Pleasant. I've also included the install manual for reference.

On page 11 you will find more images regarding the flashing/transition components (also seen below):



Thank you,

Lynelle Mastromarino

Permit Coordinator | Operations

240 Ballardvale St. Unit A Wilmington, MA 01887
E. lmastromarino@tesla.com T. 978.956.3146

TESLA

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11 attachments

Dormer and Valley close up.jpg
205K

Dormer and valley.jpg
233K

Flat roof.jpg
6884K

Ridge_ Hips_Vents.JPG
155K

Roof Pullback.JPG
95K

SR Historical Home front.jpg
1015K

SR Historical home side.jpg
679K

SR Ridge.jpg
246K

SR.jpg
185K

SR close up.jpg
245K

Solarglass Roof V3 Installation Manual 8_13_20.pdf
11650K

Michael’s Photographs






TESLA

21

SOLAR ROOF

INSTALLATION MANUAL

22

DISCLAIMER OF LIABILITY

Tesla Incorporated (“Tesla”) and its subsidiaries are not liable for any damages caused by failure to follow the instructions and guidelines found in this manual, or from inappropriate use or maintenance of PV Modules. This includes, without limitation, any damages, losses, and expenses caused by non-observance of the instructions of this manual, as well as damages, losses, and expenses caused by, or in connection with, products of other manufacturers.

NOTICES

The information in this manual is believed to be reliable, but does not constitute an express or implied warranty. Tesla reserves the right to make changes to its PV Modules and other products, their specifications, or this manual without prior notice.

This manual applies to Solar Roof PV Modules, Roofing Tiles, Partial Tiles, the Prepared Roofing System elements which serve as their mounting system, and electrical wiring elements manufactured by Tesla. It is explicitly written for qualified professionals (“Installer” or “Installers”), including without limitation licensed electricians and NABCEP-Certified PV Installers.

CONTACT INFORMATION

SOLAR SYSTEMS TECHNICAL PUBLICATIONS
solarsystemstechpubs@tesla.com

TESLA, INC
3500 Deer Creek Road
Palo Alto, CA 94304 U.S.A.

23

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE IMPORTANT SAFETY INSTRUCTIONS

All instructions must be read and understood before attempting to install, wire, operate, or maintain a PV system. Failure to read and comply with any of the limitations noted herein can result in property damage, serious bodily injury, or death.

The installer assumes the risk of all injury that might occur during installation, including, without limitation, the risk of electric shock.

Tesla Solar Roof is engineered to safely withstand applicable live loads required by building code for steep slope applications. However, to ensure safety and maintain maximum roof life, walking on a Solar Roof should be avoided except by trained Tesla Solar Roof installation professionals and first responders. This is a common recommendation for other high-end roof types, including slate, clay, concrete, and composite tile products.

- Use qualified personnel for installation. Installing a Solar Roof requires specialized skills and knowledge.
- Abide by local, regional, and national statutory regulations when installing the system, and obtain a building permit if necessary.
- Use equipment, connectors, and wiring suitable for solar electric systems.
- Work under dry conditions and use dry tools.
- Use fall protection when working from heights of 6 feet (183 cm) or above. Follow Occupational Safety and Health Act (OSHA) or local governing safety regulations regarding Fall Protection.
- Use insulated tools that are approved for working on electrical installations.
- Wear suitable personal protection equipment (PPE) to prevent the risk of personal injury, such as fall hazards or electrical hazards.
- Consult your local authority for guidelines and requirements for building or structural fire safety.

NOTE TO TRAINED PROFESSIONALS

⚠ DANGER: Tesla Solar Roof is slippery and is a fall hazard. Only access a Solar Roof with appropriate safety equipment and while wearing personal fall protection. An approved and safe walking platform should be used when accessing the roof to prevent falls, and damage to the roof. In addition, skylights, roof openings and light transfer panels must be covered with approved covering to prevent falls.

⚠ DANGER: In the event of a fire at the premises, rapid shutdown equipment in the array will reduce voltages and control the hazard for firefighter operations. Nevertheless the array wiring should be treated as potentially dangerous, especially if it is damaged by heat or flames. Inform the fire crew about the particular hazards from the PV system, and stay away from all elements of the PV system during and after a fire until the necessary steps have been taken to make the PV system safe.

SOLAR ROOF MODULE INFORMATION

24

CERTIFICATIONS

UL Listed	ETL Listed
UL 61730	UL 790 Class A
UL 9703	TAS100
UL 1741	ASTM D3161 Class F

ELECTRICAL CHARACTERISTICS

Maximum open circuit voltage rating of connected branch circuits per diode (at STC): 13.34 V

Maximum series fuse rating: 10 A

Maximum system voltage: 1000 V (for installations above 2000 m but below 3000 m the system voltage is 877 V)

Temperature coefficient for voltage at open-circuit: -0.299 (%/°C)

Temperature coefficient for maximum power: -0.395 (%/°C)

Temperature coefficient for short-circuit current: 0.047 (%/°C)

Protection Class: II

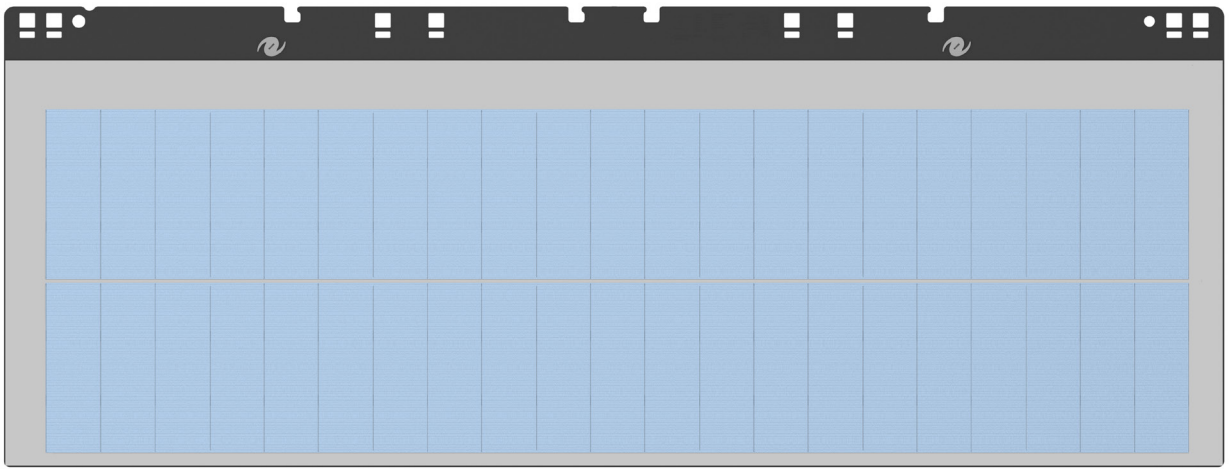
Ambient temperature range: -40 °C to +40 °C

Wire: 12 AWG, PV wire, 90 °C wet or dry
Only PV connectors compatible with type PV-KST4/6II-UR or type PV-KST4-EVO2 (male), PV-KBT4/6II-UR or PV-KBT4-EVO2 (female) from Staubli may be used to connect to the PV module.

MODEL #SR60T1 14-CELL MODULE

Irradiance (W/m^2)	Temp. (Celsius)	Voc (V)	Vmp (V)	Isc (A)	Imp (A)	Pmax (W)
1000	25	13.34	10.99	5.65	5.32	58.47

These electrical characteristics are within ± 5% of the indicated values of Isc, Voc, and Pmax under standard test conditions (irradiance of 1000 W/m^2, AM 1.5 spectrum, and a cell temperature of 25 °C or 77 °F).



Dimensions	430 mm x 1140 mm Appx. 5 mm module thickness with 35.3 mm maximum height from deck
Principal Materials	Glass, Polymers, Fiberglass and Silicon
Installed System Weight	Textured Glass: 16.4 kg/m² or 3.4 psf Installed weights include all components of system above roof sheathing

PVRSA Model: Solarglass Roof Rapid Shutdown Array

Category QIJR, Report Date: 2020-05-01

TABLE OF ESSENTIAL ELEMENTS

Function	Manufacturer	Model No.	Firmware Versions and Checksums	Certification Standard
PVRSE Mid Circuit Interrupter (MCI)	Delta Electronics	GPI00010114 [2]	2.1.6	UL 1741 PVRSE
Inverter	Delta Electronics	M4, M5, M6, M8, M10	Sys: 2.2.11 Pwr: 1.4.9 Safety: 1.4.3	UL 1741
PV Module	Tesla	SR60T1	N/A	UL 61730
Diode Harness	Tesla	SRDTH	N/A	UL 9703
PV Wire Jumper(s)	Tesla	SR-BJ2X, SR-BJ3X, SR-BJ4X, SR-BJMini	N/A	UL 9703
Pass-Through Box	Tesla	SRPTB-4	N/A	UL 1741
PVRSA Initiator [1] (See installation req. below)	Non-Specific	N/A	N/A	N/A

1 Dedicated PV system AC circuit breaker or AC disconnect switch, labeled per NEC 690.12 requirements.

2 Applies to variations of this part number, e.g. suffixes.

Note: PVRSA installation requirements may reduce the effective equipment and component ratings below the individual equipment and component PVRSE ratings in order to achieve PVRSA shock hazard reduction requirements.

PVRSA INSTALLATION REQUIREMENTS

Max System Voltage	600 VDC
Max Array Internal Voltage After Actuation	165 VDC (cold weather open circuit)
Max Series-Connected Panels between MCI Output Connections:	10
Max Series-Connected Panels Connected to MCI Inputs:	5

OTHER INSTALLATION INSTRUCTIONS

1. MCIs shall be positioned at a slight angle during installation on roof deck to assist with water shedding.
2. An MCI must be connected to one end of each series string or mounting plane sub-array string.
3. Verification that MCIs are installed with 10 or fewer modules between MCI output connections shall be documented for inspection, by voltage measurement logs and/or as-built string layout diagrams.
4. The dedicated PV system AC circuit breaker or PV system AC disconnect switch shall serve as the PVRSA initiator and shall be sized and installed in accordance with NEC requirements. The specific part shall be identified on the as-built system drawings.

UL CERTIFIED SAFETY US E515336

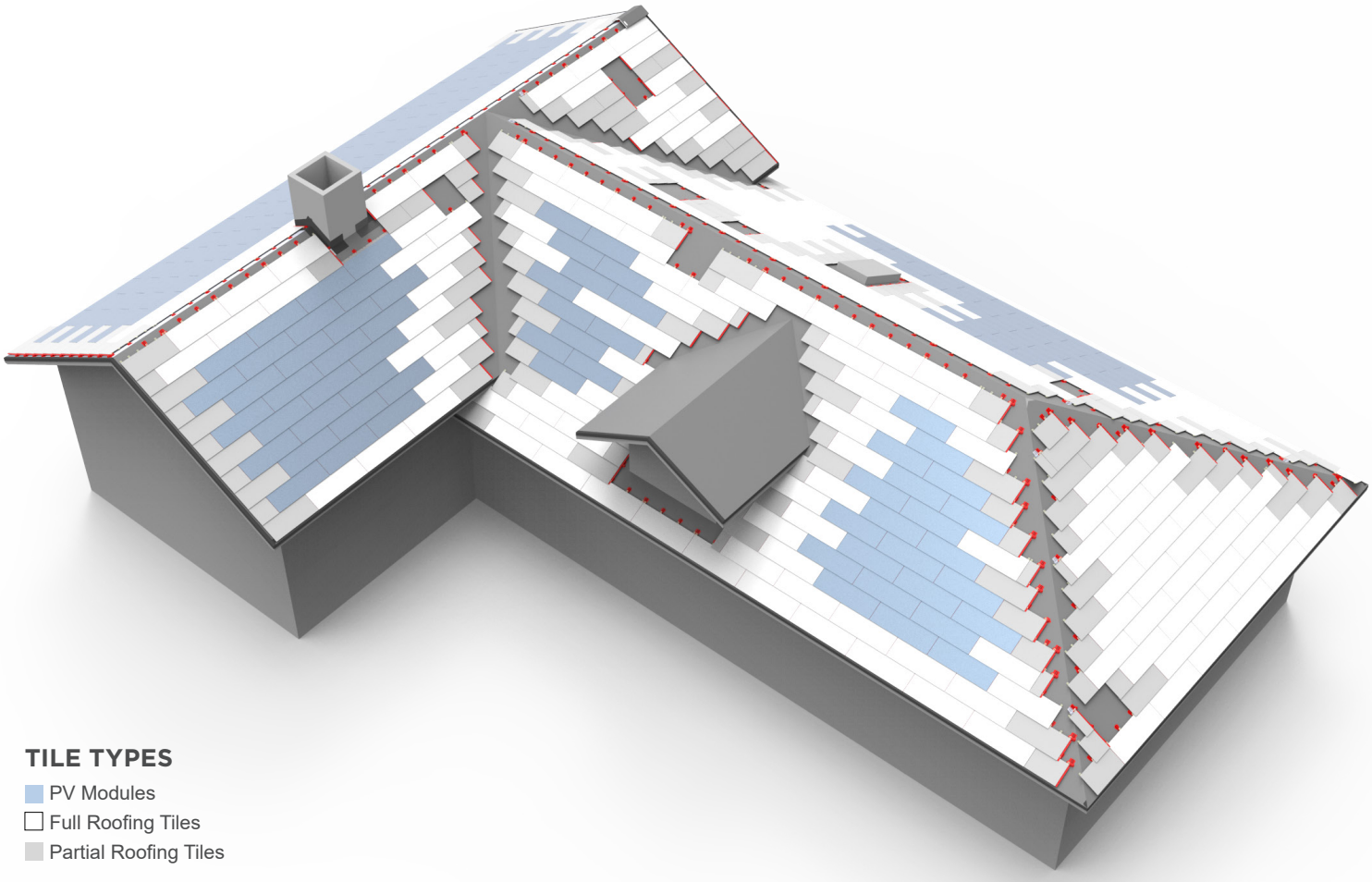
Certification Mark of UL on the installation instructions is the only method provided by UL to identify products manufactured under its Certification and Follow-Up Service. The Certification Mark for these products includes the UL symbol, the words "CERTIFIED" and "SAFETY", the geographic identifier(s), and a file number.

SOLAR ROOF SYSTEM OVERVIEW

26

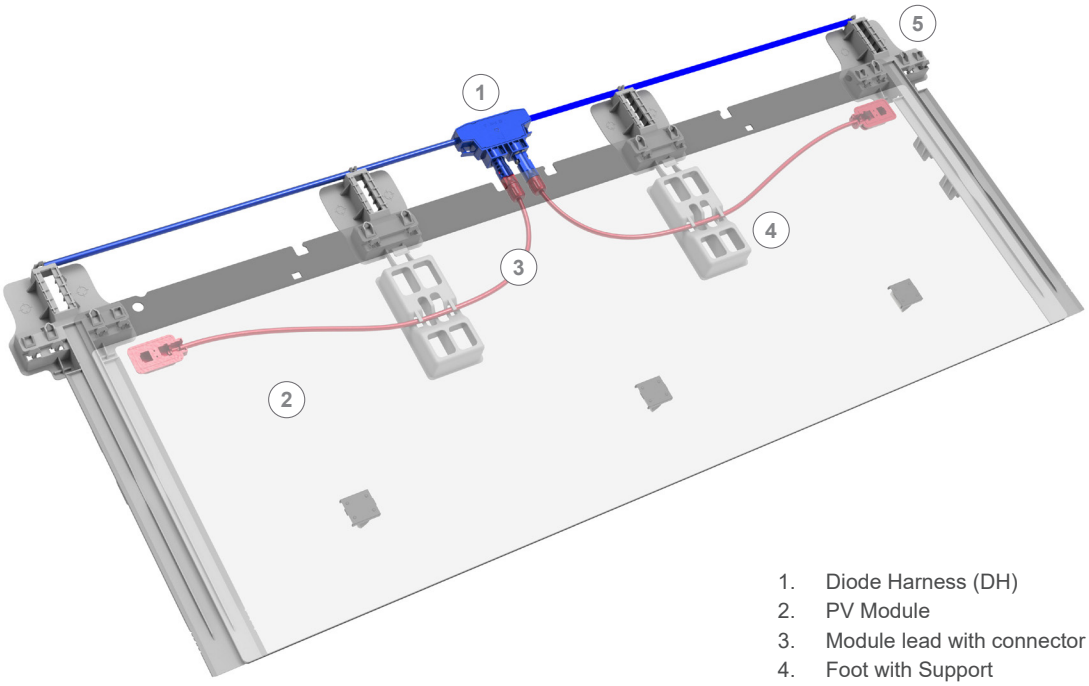
A Solar Roof functions in fundamentally the same way as traditional roof-mounted PV systems. Sunlight is converted to DC electricity at each individual module. Individual modules are connected in series using diode harnesses to form a complete PV “string.” One or more strings connect in parallel at a typical string inverter to convert power to AC.

TRADITIONAL PV	TESLA SOLAR ROOF
DC modules	DC modules
Tempered glass	Tempered glass
Silicon cells	Silicon cells
Backsheet & encapsulant	Backsheet & encapsulant
Module J-boxes, PV wire and Listed connectors	Module J-boxes, pv wire and Listed connectors
Series strings below 600 V	Series strings below 600 V
DC - AC inverters	DC - AC inverters
Rapid shutdown (2014 or 2017)	Rapid shutdown (2014 or 2017)



27

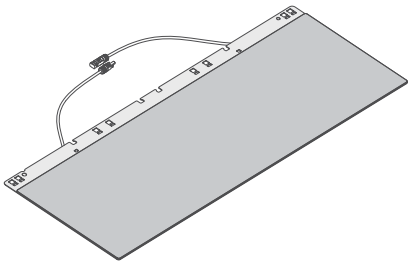
Evaluate preliminary PV layout prior to tear-off to verify that arrays will fit as designed. PV array layout must follow plan set when possible. Always communicate field changes with the installation hotline team. Field changes may cause BOM change (Diode Harness length and count, Jumper length and count, Partial Tile count).



1. Diode Harness (DH)
2. PV Module
3. Module lead with connector
4. Foot with Support
5. Footlap

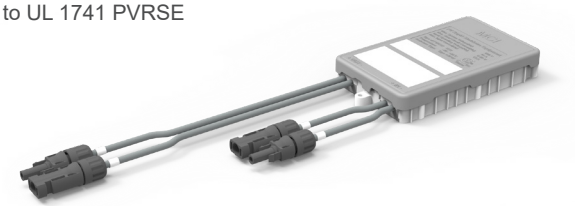
PV MODULE

Model #SR60T1
Listed to UL 61730
UL 790 Class A
ASTM D3161 Class F
TAS100



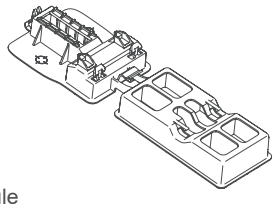
MCI RAPID SHUTDOWN

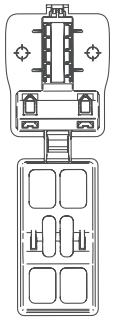
Model #EE-002605-003, Delta #GPI00010110
600V, 12A, NEMA 4X, MC4
Listed to UL 1741 PVRSE



FOOT WITH SUPPORT

Model #SR-FOOTSUP
Listed to UL 790 Class A
ASTM D3161 Class F
TAS100

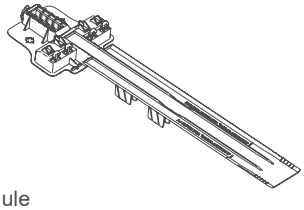




Center foot for PV module

FOOTLAP

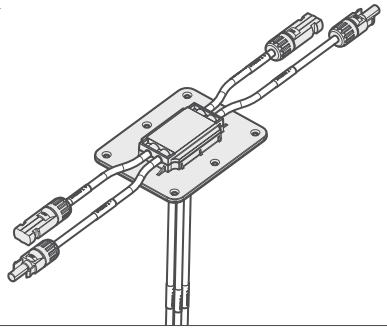
Model #SR-FOOTLAP
Listed to UL 790 Class A
ASTM D3161 Class F
TAS100



Edge foot for PV module

PASS THROUGH BOX

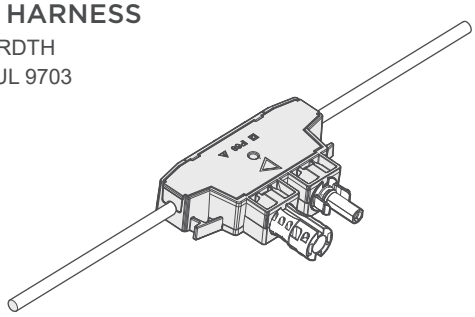
Model #SRPTB-4
Listed to UL 1741



Provides a method of transferring up to 2 PV source circuits through the roof decking to inverters or additional PV arrays.

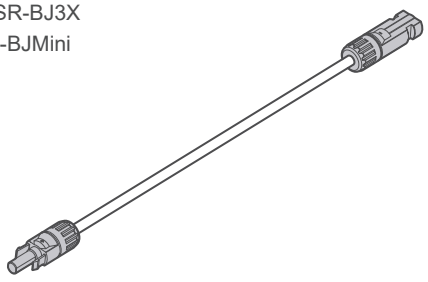
DIODE HARNESS

Model #SRDTH
Listed to UL 9703



JUMPER

Model #SR-BJ2X, #SR-BJ3X
#SR-BJ4X, and #SR-BJMini
Listed to UL 9703



BRANCH SOCKET, STAUBLI

Model #PV-AZB4
Listed to UL 6703

BRANCH PLUG, STAUBLI

Model #PV-AZS4
Listed to UL 6703

SHEATHING REQUIREMENTS

Tesla Solar Roof is installed over bare solid or closely fitted sheathing, as follows:

- Exterior grade plywood: 15/32” nominal thickness or greater
- OSB: 7/16” nominal thickness or greater
- Solid sheathing boards: minimum of 1’x4’, closely fitted

Do not install Tesla Solar Roof over widely spaced sheathing boards (sometimes referred to as “skip sheathing”). Retrofitting the existing structure with solid sheathing would be necessary. Verify the capacity of the existing structure to carry this additional load. As this procedure is beyond the scope of this manual, contact Tesla for engineering support prior to such modification.

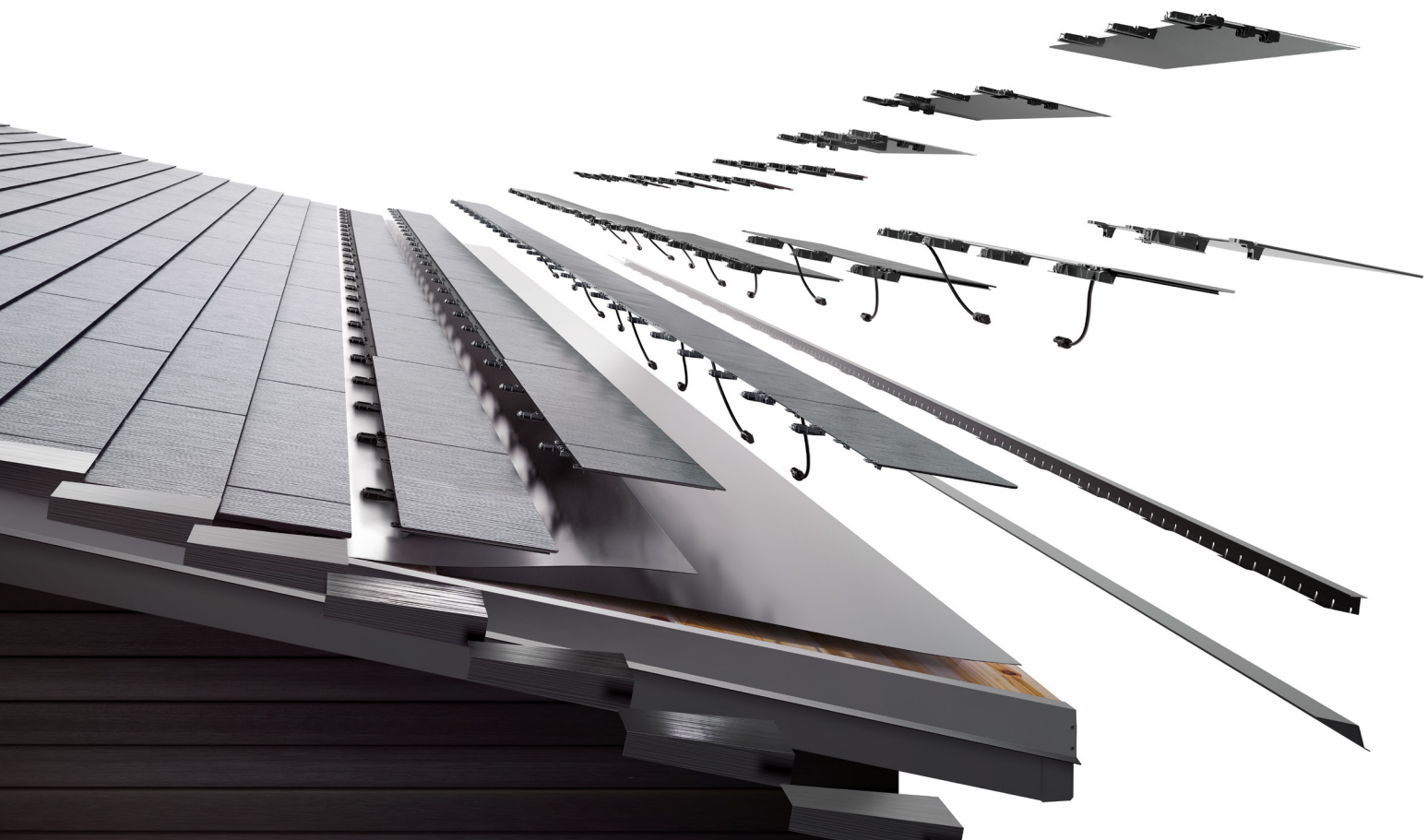
ROOF PITCH RANGE

2:12 - 20:12

UNDERLAYMENT

Firestone Clad-Gard SA FR

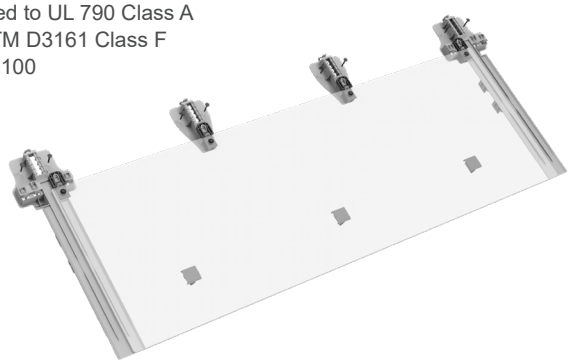
- Meets or exceeds requirements of ASTM D226 Type I & II
- Certified to ICC-ES AC188 (ESR-3979) and ASTM D1970
- Class A Fire Rated per ASTM E108



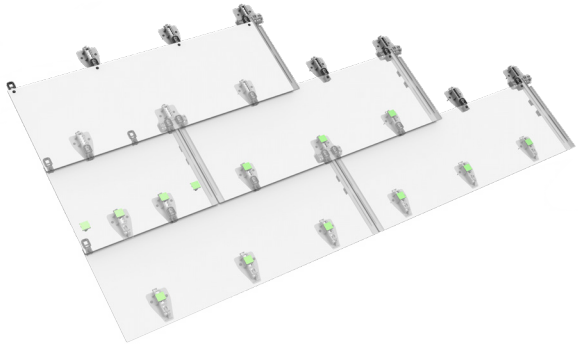
ROOFING TILES AND PARTIALS

ROOFING TILES, FULL AND PARTIALS

Listed to UL 61730
Listed to UL 790 Class A
ASTM D3161 Class F
TAS100

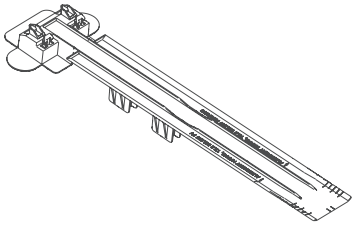


Roofing Tiles are non-electrical tiles buffering the solar array at all edge conditions. Roofing Tiles come in six different sizes to accommodate all areas of the mounting plane and are cross compatible with the PV Module hardware. The center foot is the Roofing Foot. The Reduced Footlap is used as an alternate edge foot.



REDUCED FOOTLAP

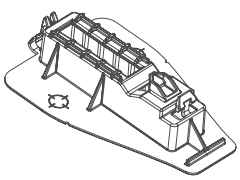
Model # SR-RFOOTLAP

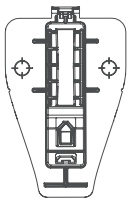


Alternate edge foot for Roofing Tile

ROOFING FOOT

Model #SR-FOOT

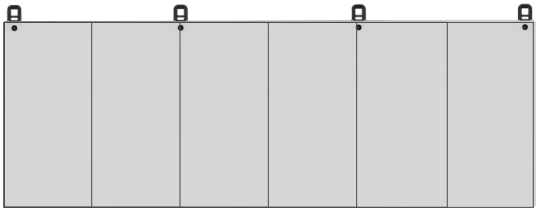




Center foot for Roofing Tile

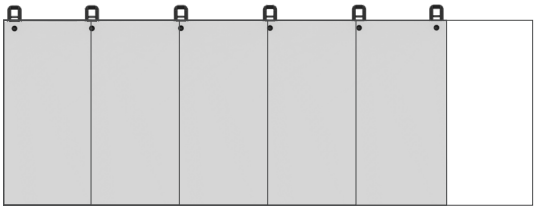
FULL TILE

Model #SRNFT1



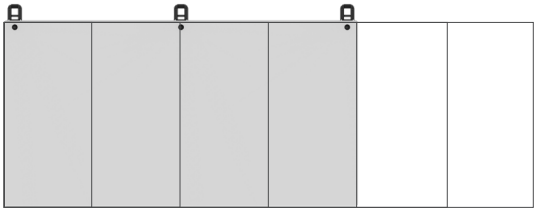
5/6 PARTIAL TILE

Model #SRNFT5/6



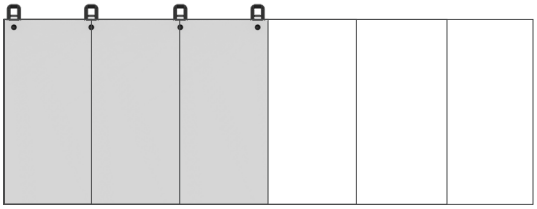
2/3 PARTIAL TILE

Model #SRNFT2/3



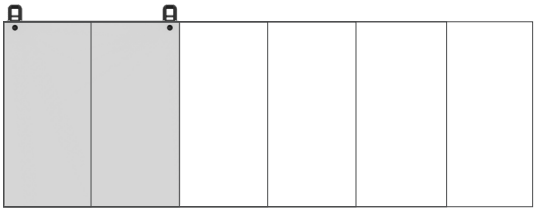
1/2 PARTIAL TILE

Model #SRNFT1/2



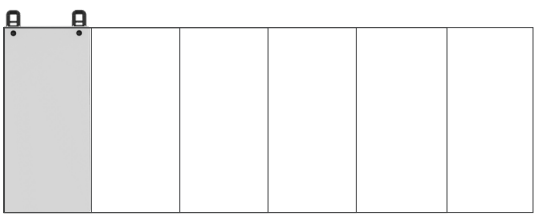
1/3 PARTIAL TILE

Model #SRNFT1/3



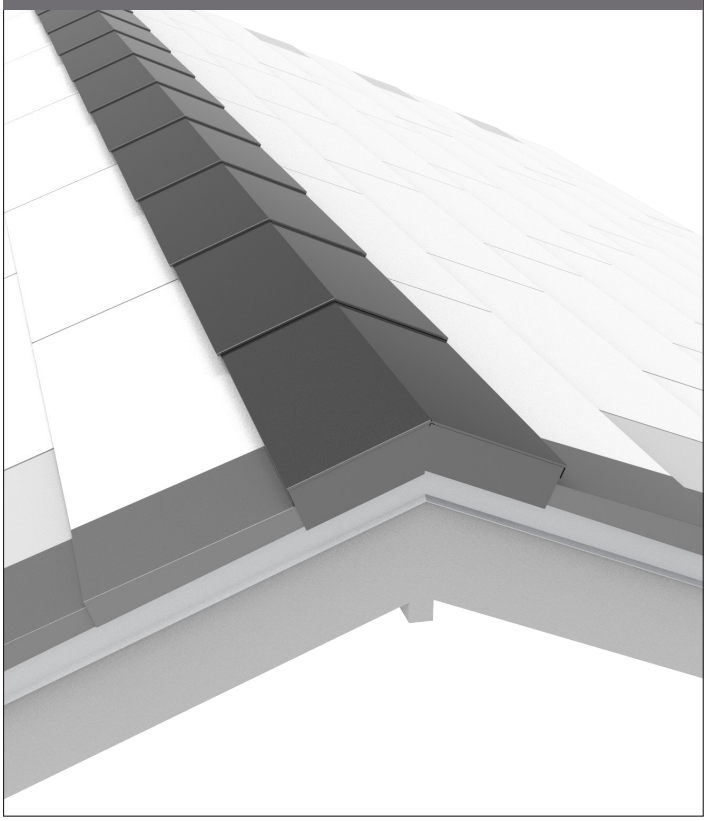
1/6 PARTIAL TILE

Model #SRNFT1/6



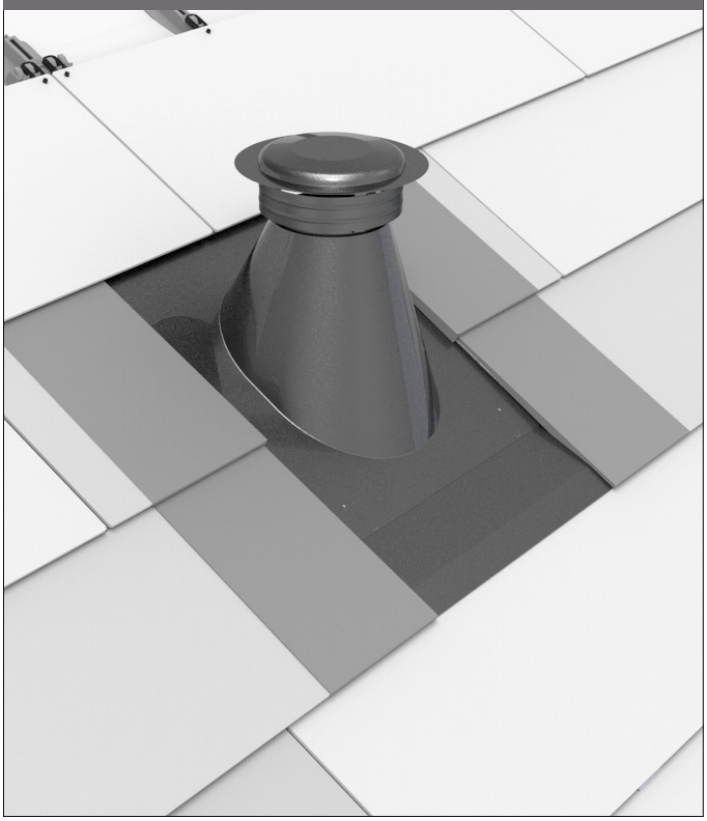
FLASHING COMPONENTS

STEPPED RIDGE DETAIL

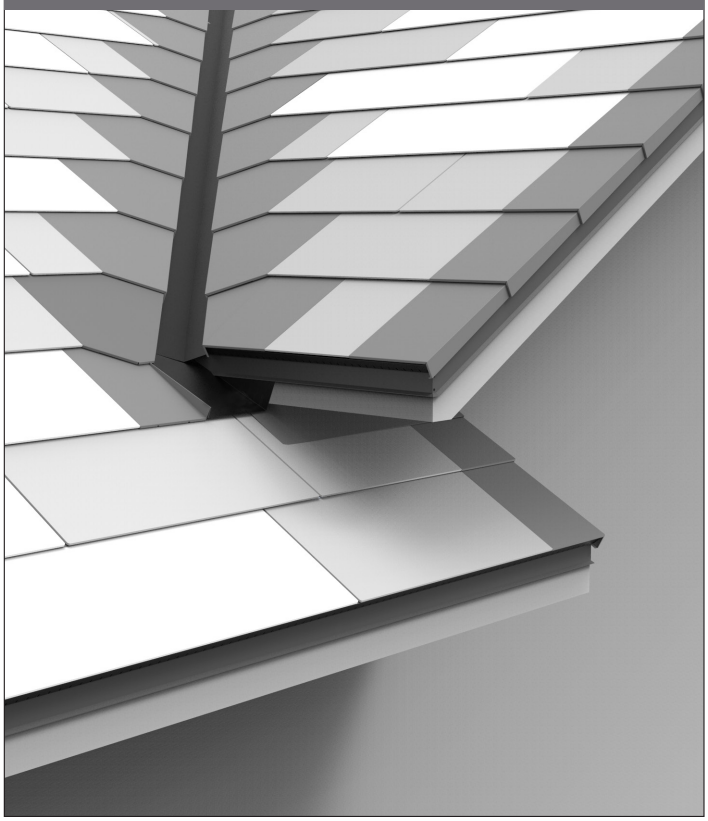


STEPPED HIP DETAIL

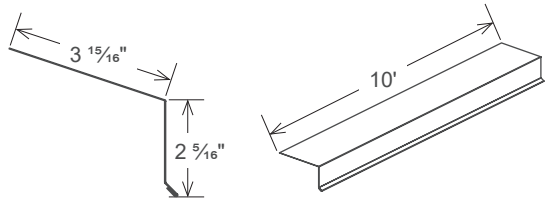
OBSTRUCTION DETAIL



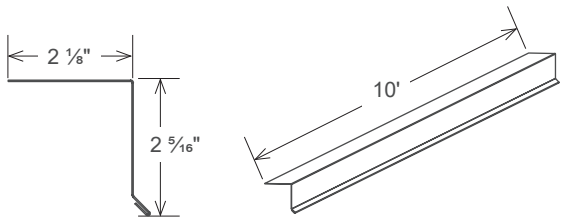
VALLEY DETAIL



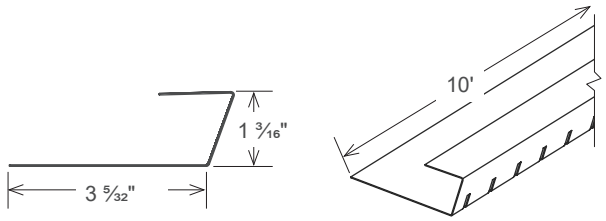
FLASHING, EAVE



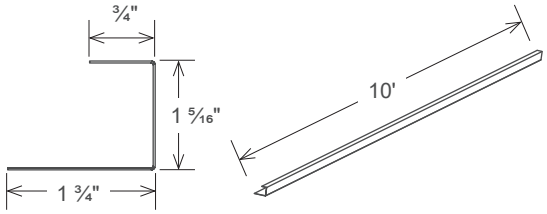
FLASHING, RAKE



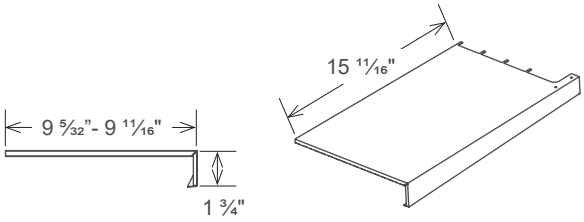
TRIM, STARTER



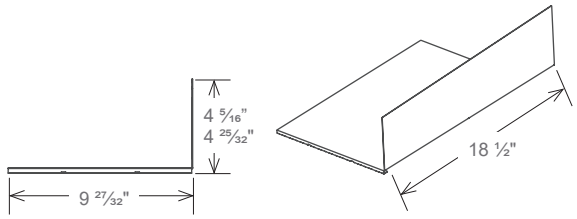
DECK, C CHANNEL



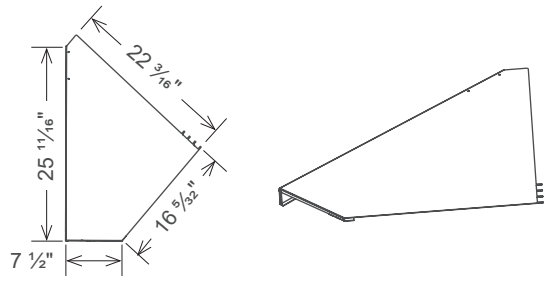
TRIM, RAKE



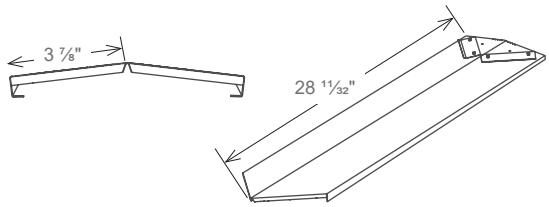
FLASHING, SIDEWALL STEP



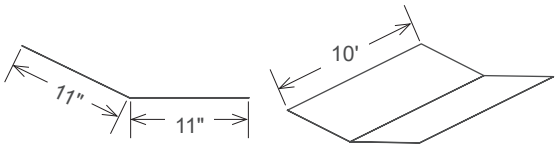
TRIM, VALLEY



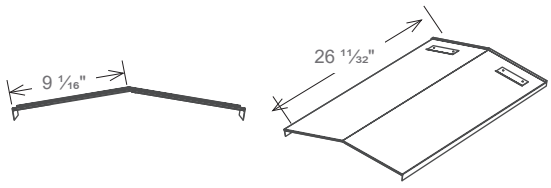
FLASHING, HIP CAP



FLASHING, VALLEY

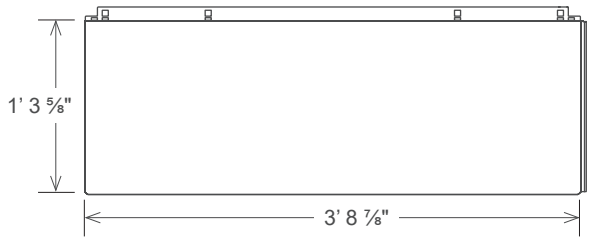


FLASHING, CAP, RIDGE

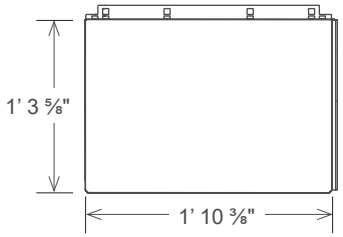


33

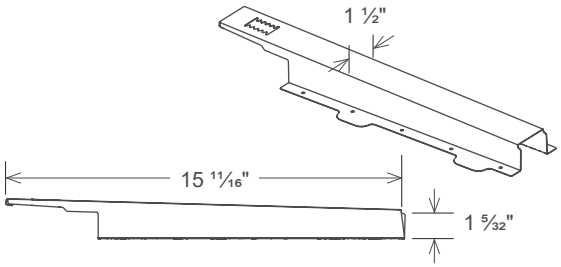
METAL TILE, FULL



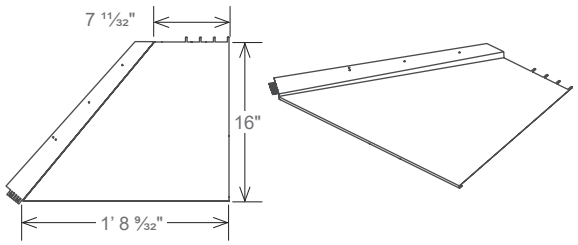
METAL TILE, HALF



FLASHING, SUPPORT BRACKET, METAL TILE

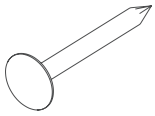


TRIM, HIP

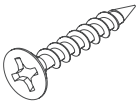


FASTENERS

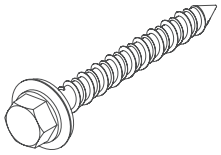
NAIL, RING SHANK ROOFING
.120" x 1.25", COLLATED, HDG



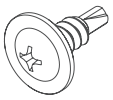
SCREW, PHILLIP BUGLEHEAD, DK
#8 X 1" COATED



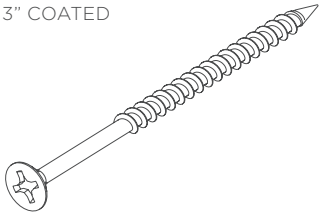
SCREW, CONCRETE
0.25" X 2.25", HEX WASHER
STAINLESS STEEL



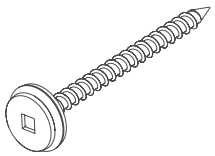
SCREW, PHILLIP, MODIFIED TRUSS
HEAD, SELF DRILLING
#8-18 x .5", STAINLESS STEEL



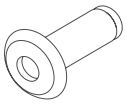
SCREW, PHILLIP BUGLEHEAD
#8 X 3" COATED



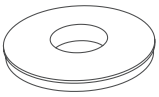
SCREW, SQUARE DRIVE CONCEALOR
BONDED WASHER
#10-13 x 2", GALVANIZED



RIVET, BLIND, DOMED
0.125" OD
0.125-0.187" MATERIAL THICKNESS



WASHER, BONDED SEALING,
0.25", STAINLESS STEEL



ELECTRICAL SAFETY PRECAUTIONS

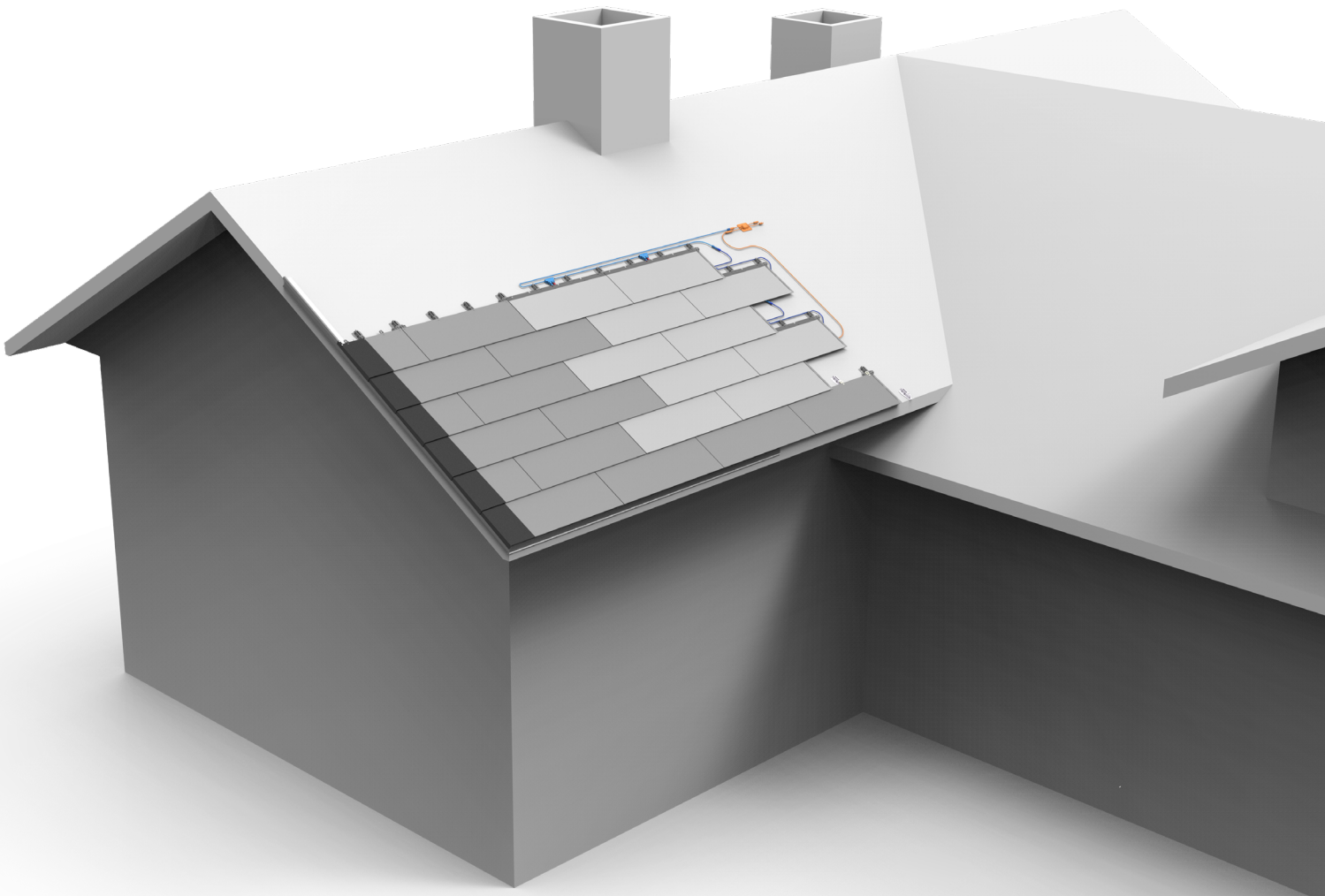
A PV Module may experience conditions that produce more current and/or voltage than reported at standard test conditions. Follow the requirements of the National Electrical Code (NEC) in Article 690 to address these increased outputs. In installations not under the requirements of the NEC, multiply the values of Isc and Voc marked on the Solar Roof PV Modules by a factor of 1.25 when determining component voltage ratings, conductor ampacities, overcurrent device ratings, and size of controls connected to the PV output.

PV MODULES AND WIRING CANNOT INTERACT WITH METAL FLASHINGS

Once energized, all components of the Solar Roof photovoltaic DC circuit, including the Diode Trunk Harness, all conductors, and the Pass Through Box must remain in isolation from metal flashings. The PV array must be buffered by non-energy generating Roofing tiles, which are designated in the project plan set.

Never locate PV Modules at true edge conditions, such as in first row at the eave or in the top two rows at the ridge.

Never locate PV Modules on the mounting plane where they may contact transition, headwall, obstruction or valley flashings.



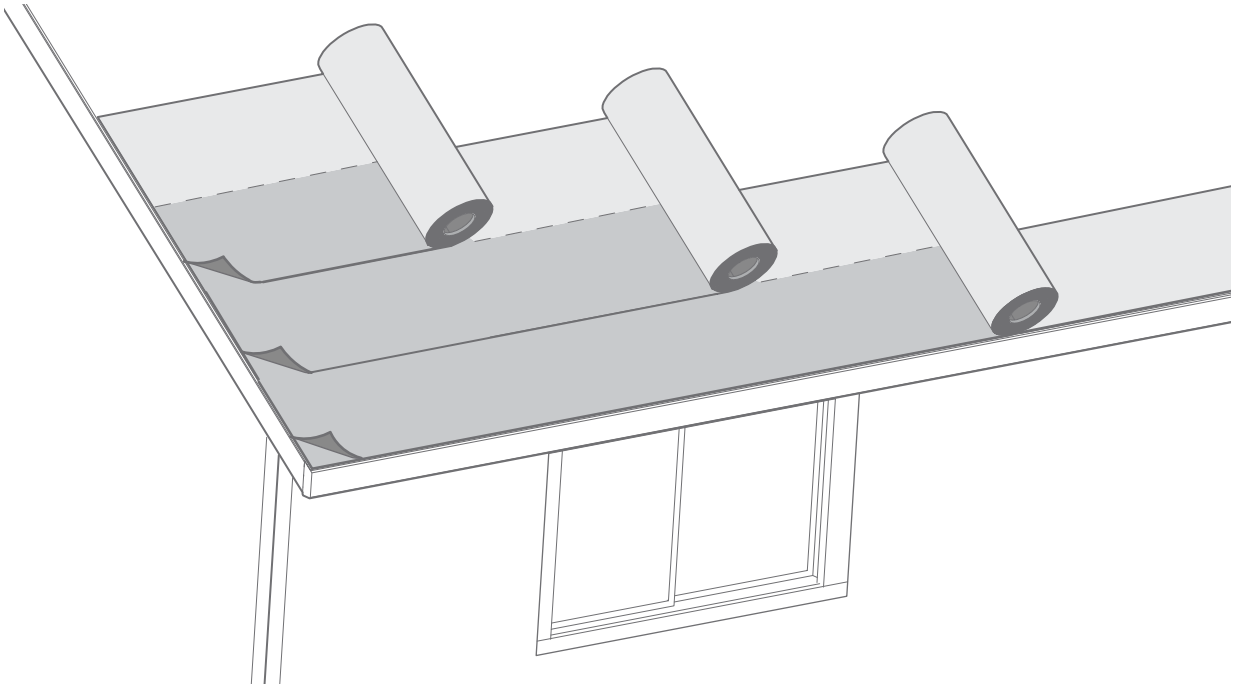
MATERIAL HANDLING

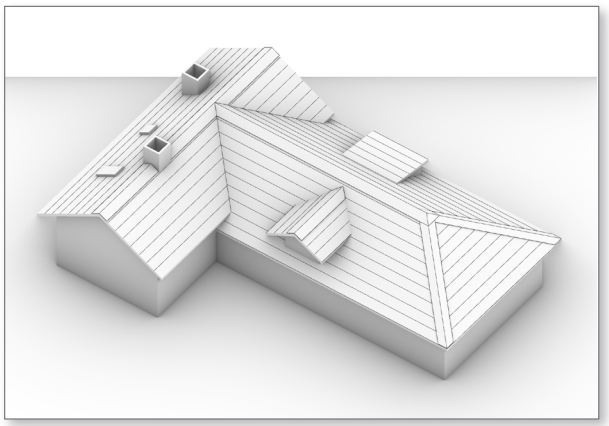
- Do not handle PV Modules under wet conditions unless wearing appropriate protective equipment.
- Do not attempt to make an electrical connection with wet, soiled, or otherwise faulty connectors.
- Do not wear metallic rings, watchbands, earrings, nose rings, lip rings, or other metallic objects while installing or troubleshooting PV systems.
- Do not use a PV Module with broken glass. A damaged PV Module cannot be repaired and must not be used.
- Do not open electrical connections or unplug connectors while the circuit is under load.
- Do not use PV Modules near equipment or in places where flammable liquid, gases, or other hazardous materials are located.
- Do not apply paint or adhesive to any module top surface or backsheet.
- Do not drop PV Modules or allow objects to fall on modules. Do not leave a module unsupported or unsecured.
- Do not disassemble or modify PV Modules in any way. Doing so may degrade performance or cause irreparable damage and will void any applicable warranties.
- Do not direct artificially concentrated sunlight onto the PV Module.
- Do not allow children or unauthorized persons near the installation site or storage site of modules.
- Wear non-slip gloves when carrying PV Modules. Exercise caution when transporting and installing PV Modules.
- Do not lift any module by the module’s junction box or electrical leads.

UNDERLAYMENT AND DECK LEVEL FLASHING

FIRESTONE CLAD-GARD

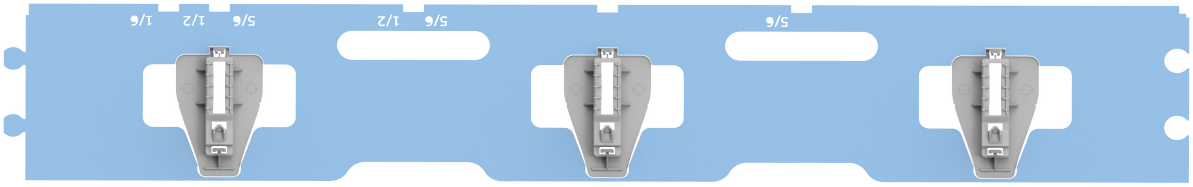
Firestone Clad-Gard is a self-adhering underlayment. Refer to the manufacturer's instructions for full details. Start with a half-width strip at the edge of the eave. Lap a full-width strip 18" to create a double layer of underlayment. Repeat this fastening and waterproofing process while moving uproof.





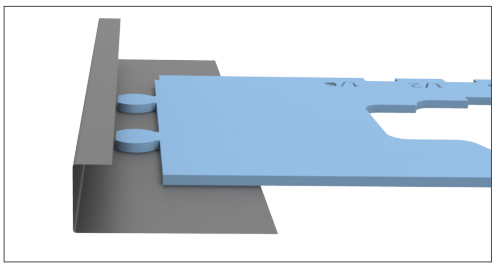
Standard Installation

STARTER COURSE | FULL TILE

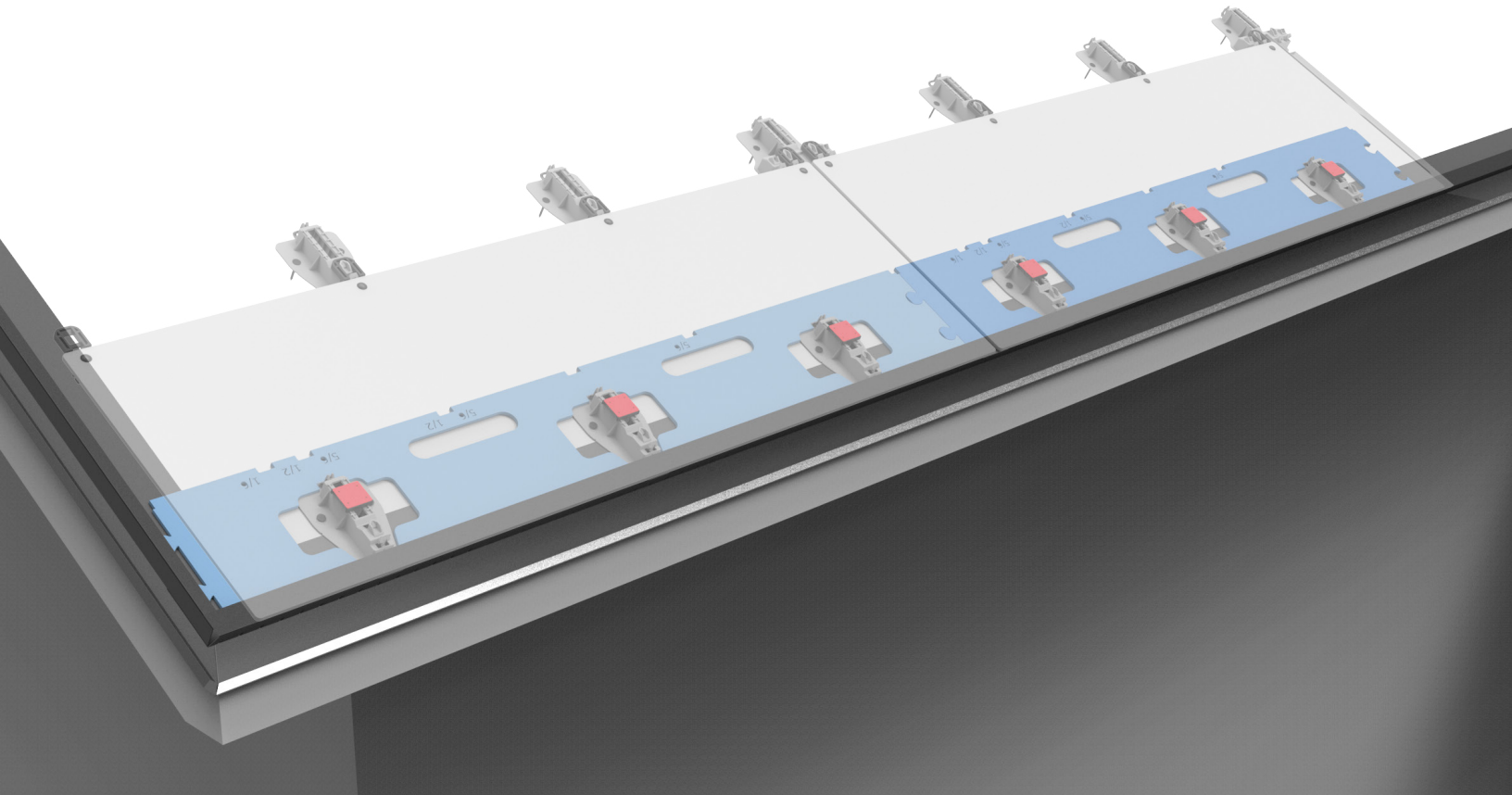


The start of the array is indicated in the project planset. If the first tile is a full tile, use the Starter Course Jig in the orientation shown above to position the first row of feet. Ensure that the inside edge of the Starter Trim is free of any debris that would push up the jig from its correct position.

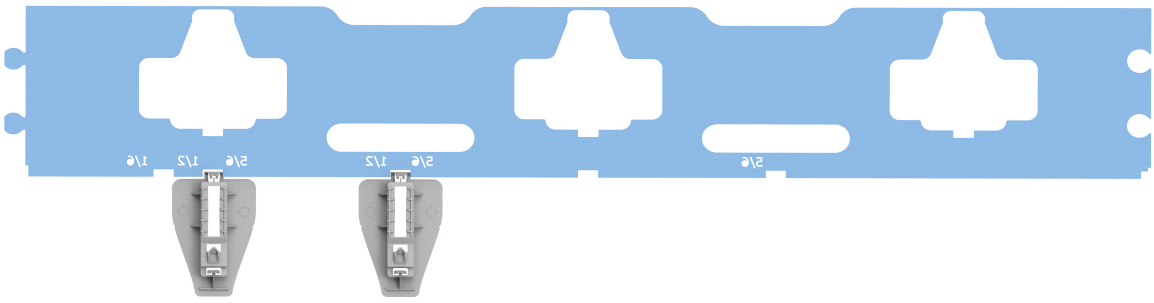
1. Abut the jig to the inside corner of the Starter Trim.
2. Align with the top edge of the Deck C-Channel to give the tile a 1” spacing the rake edge.



3. Fasten first row feet. Continue along the eave by snapping a second jig into the first jig.
4. Install the first tile by engaging the Uplift Clip into Foot slot then fastening the remaining feet.

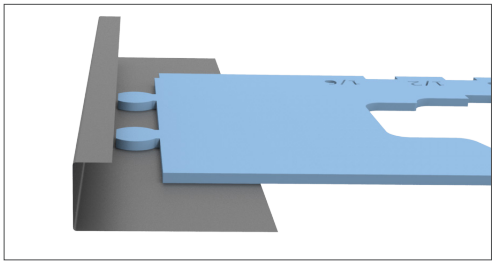


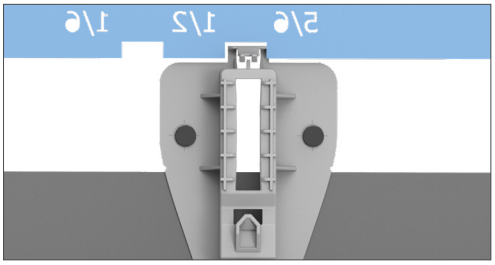
STARTER COURSE | PARTIAL TILE



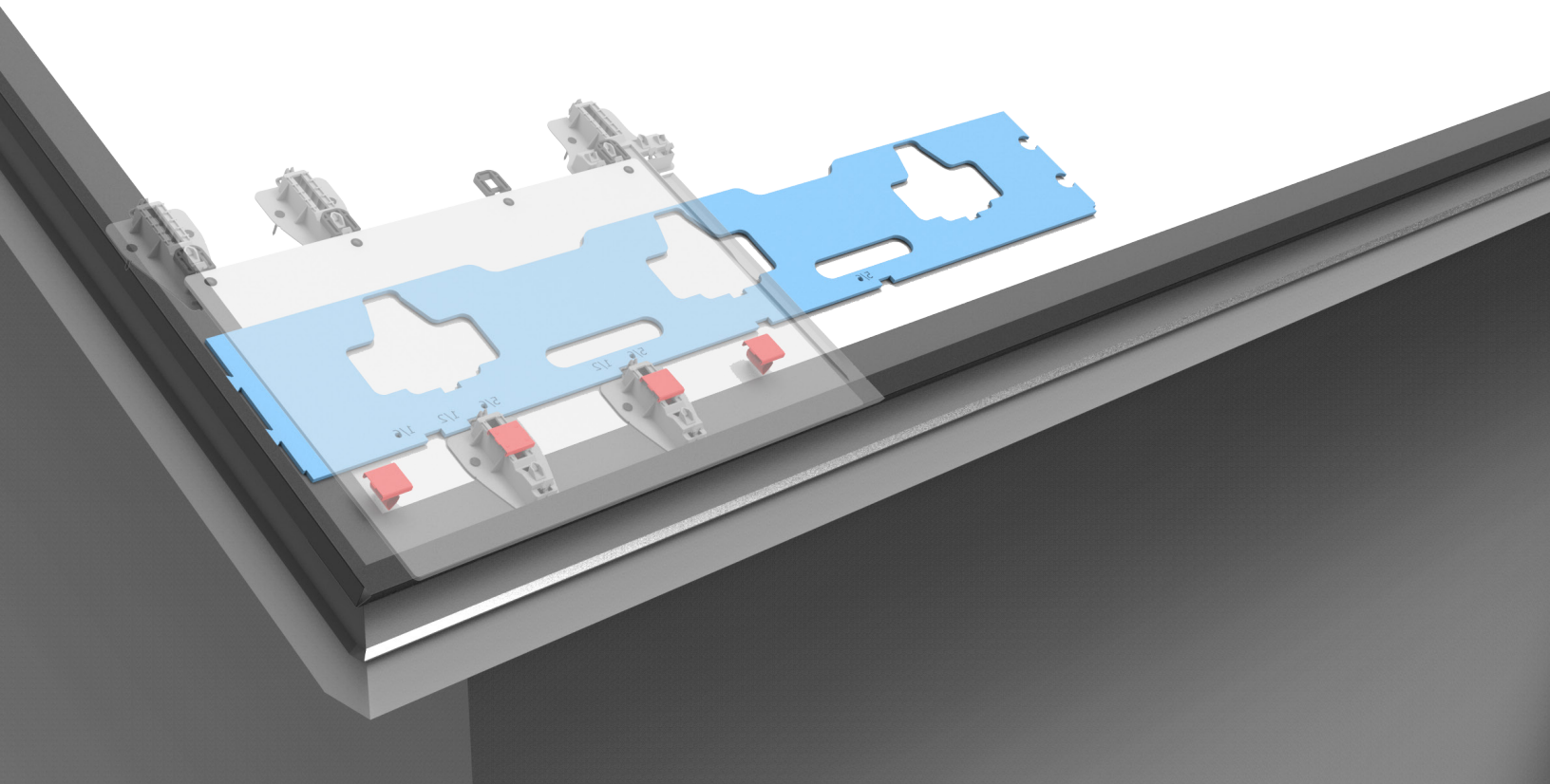
The start of the array is indicated in the project planset. If the first tile is a partial tile, use the Starter Course Jig in the orientation shown above to position the first row of feet.

1. Align the feet to the edge of the Starter Trim using the notches in the foot.
2. Align with the top edge of the Deck C Channel to give the tile a 1” spacing the rake edge.





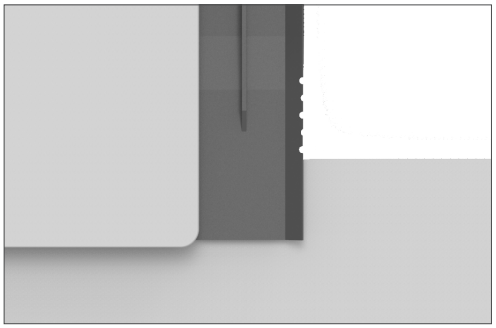
3. Fasten first row feet. Continue along the eave by snapping a second jig into the first jig.
4. Install the first tile by engaging the Uplift Clip into Foot slot then fastening the remaining feet.

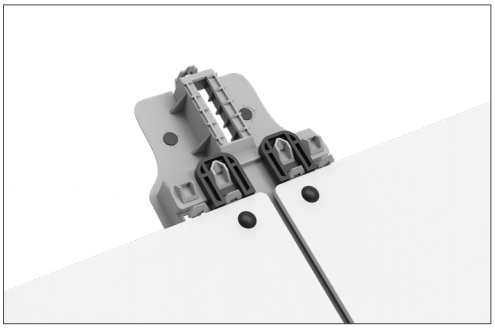


ARRAY LAYOUT & SECOND ROW

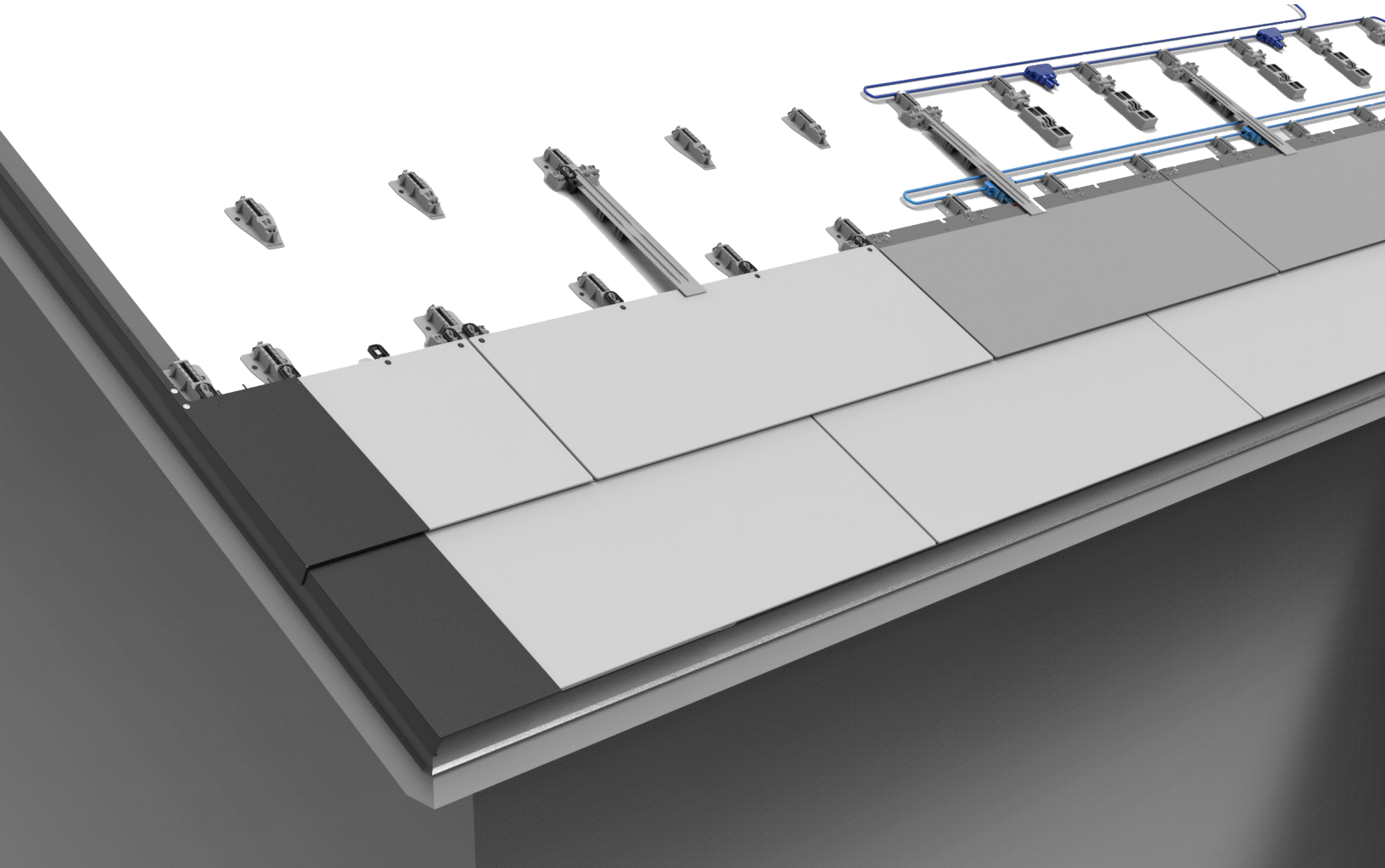
Continue the Roofing Tile and Partial Tile uproof row by row.

1. Position the row spacing (tile reveal) using the timing marks on the Footlap.
2. Adjacent Roofing Tiles will share a Footlap.

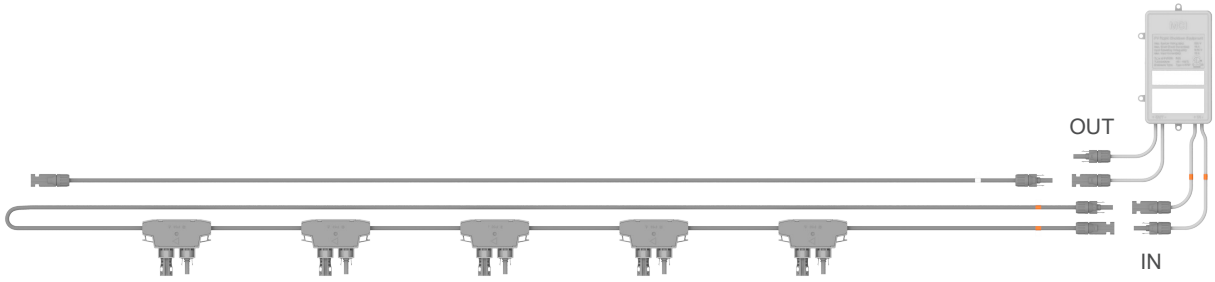




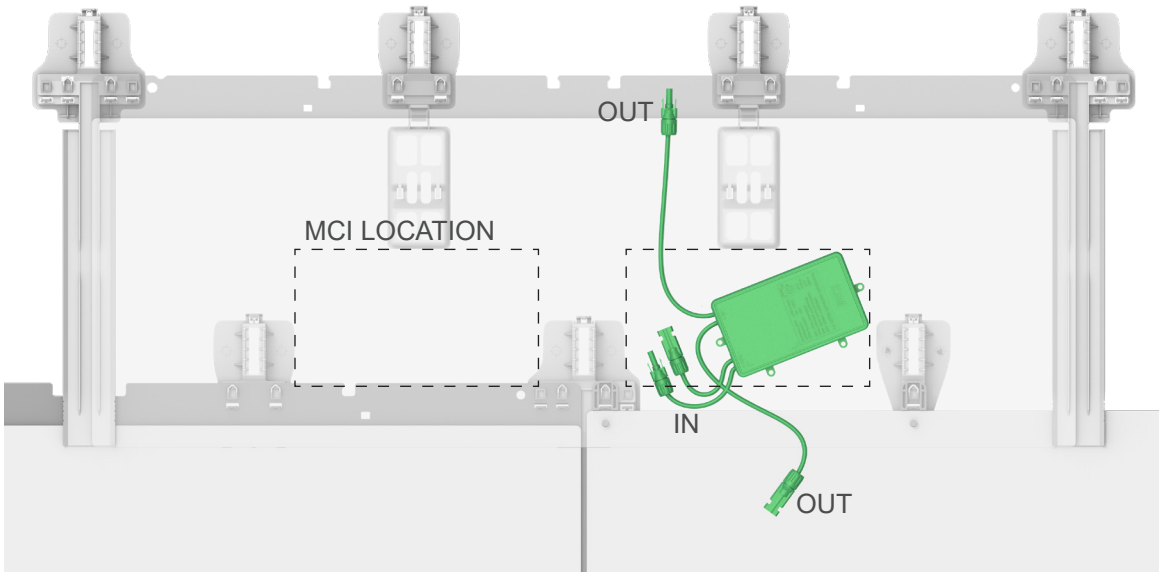
3. Engage the Uplift Clip(s) to a minimum of one foot downroof. Each tile needs to be anchored with at least three feet total.
4. Install the appropriate tile level flashings over the Roofing and Partial tiles at edge conditions.



MID-CIRCUIT INTERRUPTER



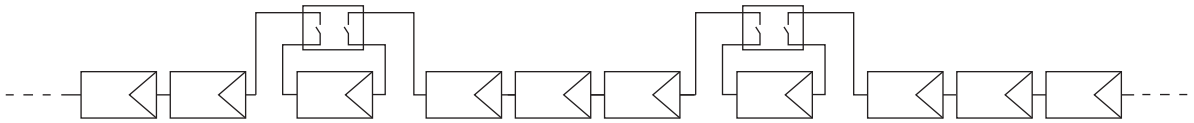
The Mid-Circuit Interrupter is installed directly above the row or sub-string of modules that connects to its input. Abide by all MCI Manufacturer instructions when installing the MCI. Fasten the MCI to the deck using standard fasteners. The input leads are shorter and connect to the positive and negative terminations of that Diode Harness sub-string. The output leads connect to the Diode Harness sub-strings above and below.



INSTALLATION BEST PRACTICES

- Position the MCI at a slight angle to assist with water shedding.
- Install the MCI between the module feet. The MCI cannot interfere with module supports.
- Do not install the MCI in a manner which would cause it to raise the PV Module above it. For example, directly underneath a Footlap.
- Provide enough clearance so the MCI does not directly contact the downroof module. The MCI cannot come in contact with the glass or backside of a module.
- For ease of installation, position the MCI to the right or left of the last PV Module.

POWER FLOW DIAGRAM

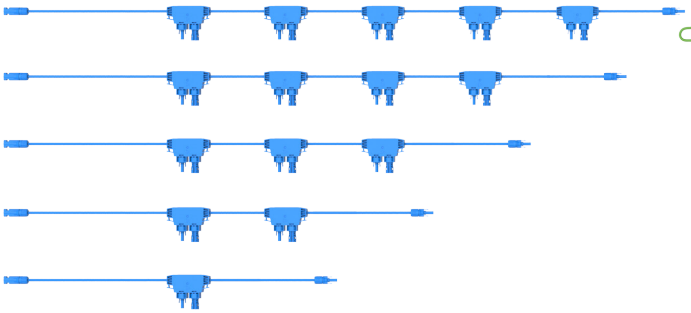


SERPENTINE WIRING SCHEMATIC

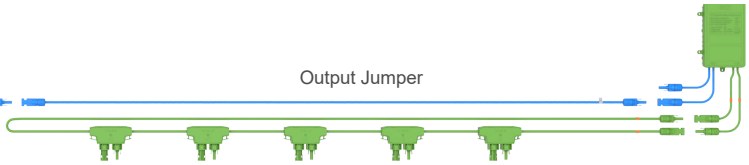
A serpentine wiring schematic weaves back and forth along the PV array. Connect the 5x Input Harness to the MCI input, then connect 10 or fewer Solar Roof PV Modules between MCI units.

- Do not swap input and output leads, this may overpower the MCI.
- Maximize the number of tiles per MCI (both input and output). To minimize hardware costs, avoid connecting MCI output directly to output of another MCI where feasible.
- An MCI must be connected to one end of a series string or sub-array string. It is not required on both ends. Whether the MCI is connected to the “first” or “last” module in a series string is not important.
- Use the wire management features on the module feet to hold up to 3 conductors. Tuck the Diode under the module.
- For areas with skipped PV Modules, such as at obstructions, install a Mini Jumper at the diode to close the circuit. Failing to do so will result in an open circuit and the entire string will not yield any energy.

Modified Cable Lengths on 1, 2, 3, 4 and 5x

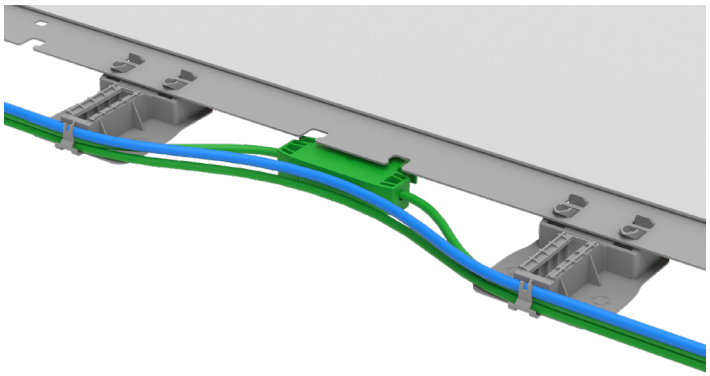


Output Jumper

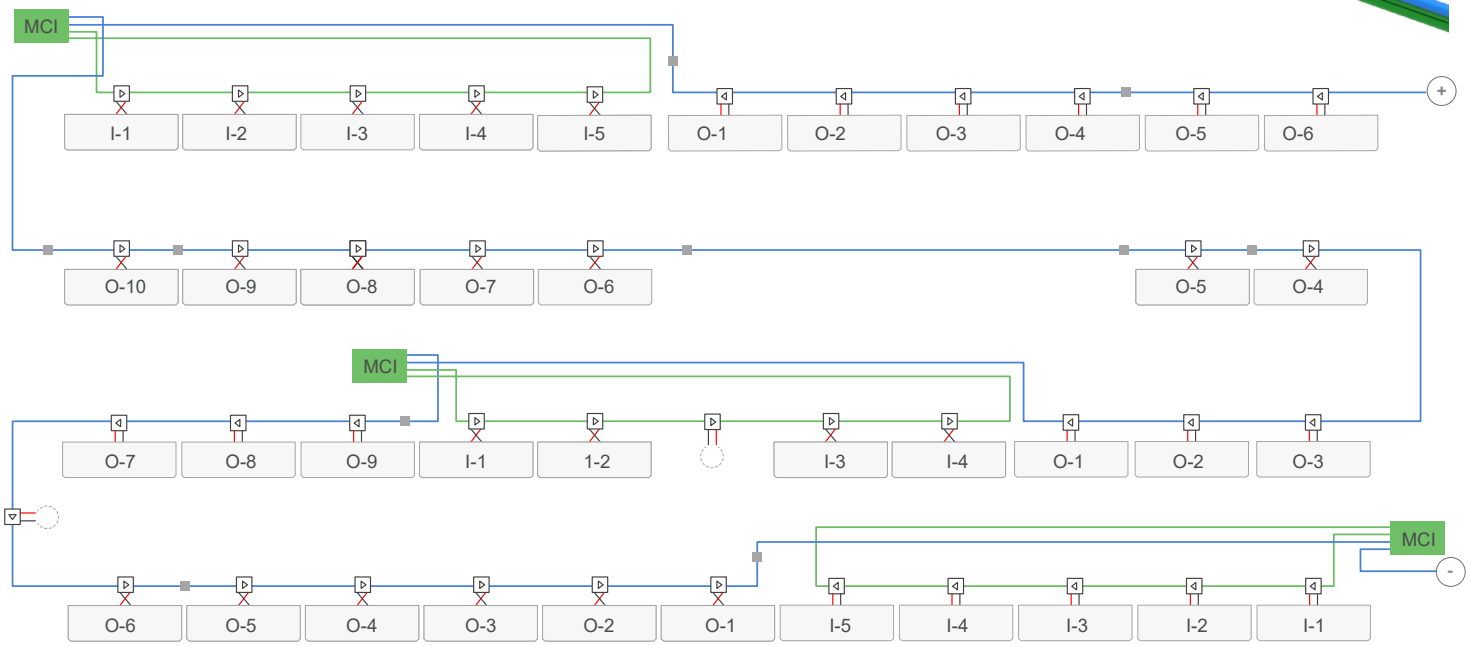


5x Input Harness

5x Input Harness with Output Jumper tucked into wire management feature.



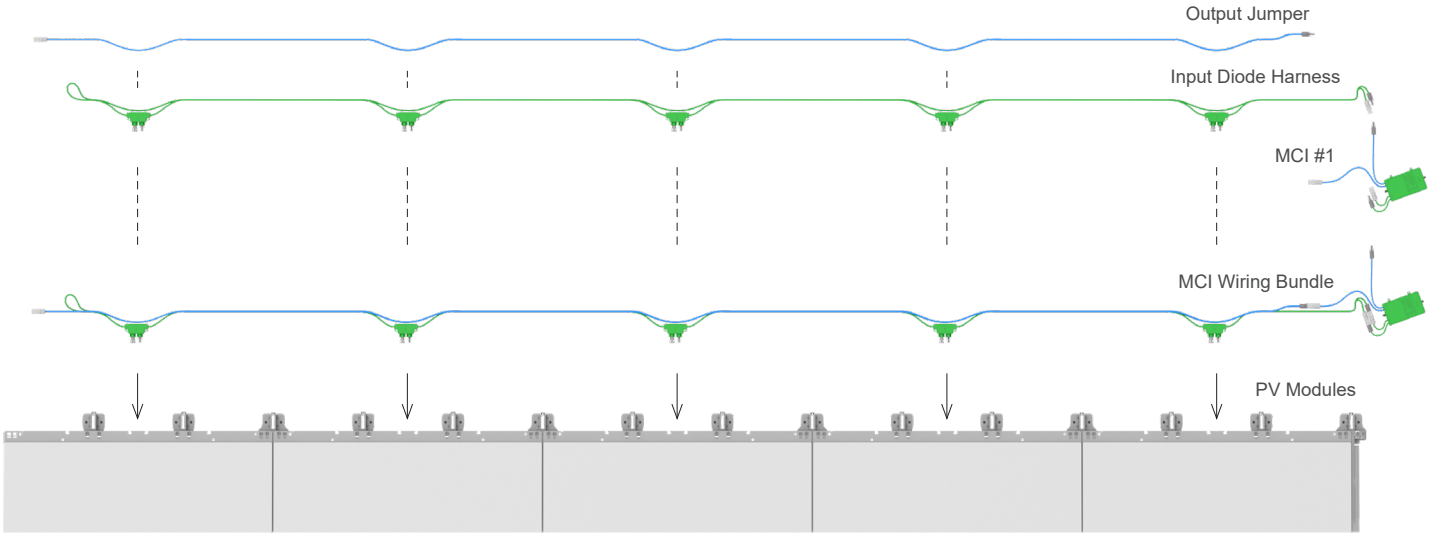
Example PV Array with 3 MCI Units

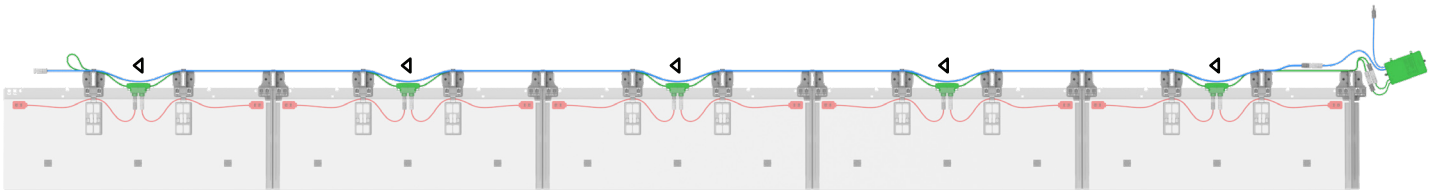


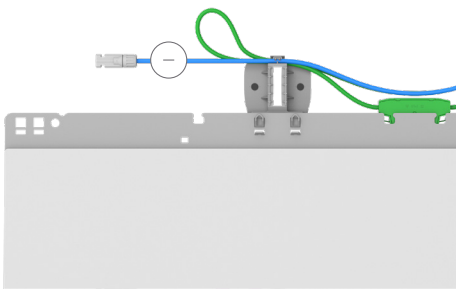
SERPENTINE WIRING SCHEMATIC

MCI INPUT ASSEMBLY

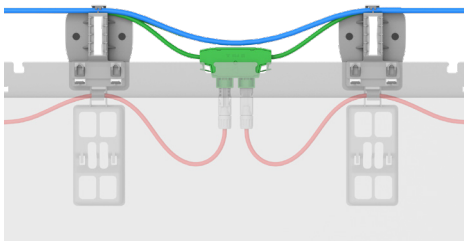
Connect 3 to 5 Solar Roof PV Modules to the MCI input (80V max). These modules will power the MCI. The wiring bundle contains the positive and negative input leads and a jumper to connect to the next (output) diode harness.



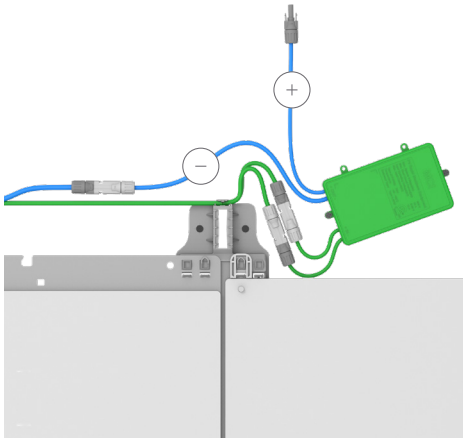




The input wire will wrap back to the MCI while the output wire extends to the next (output) 10x diode harness.



Plug the PV Module into the Diode and tuck the Diode under the PV Module.



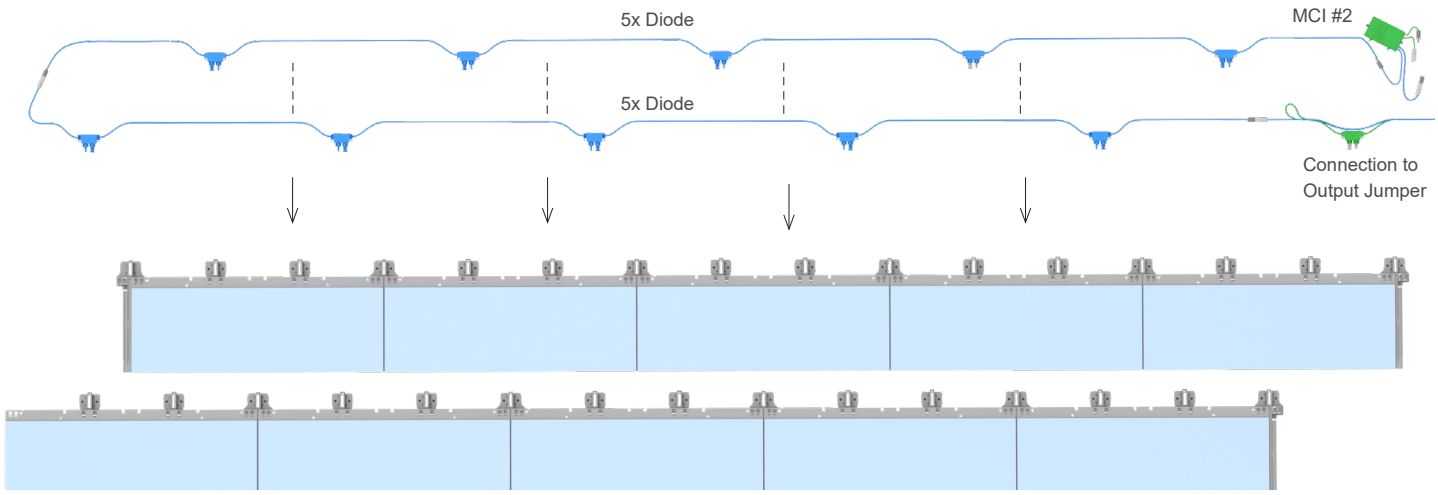
If not pre-assembled,connect the positive (female) and negative (male) input leads into the MCI. Connect the negative (female) output lead to the MCI.

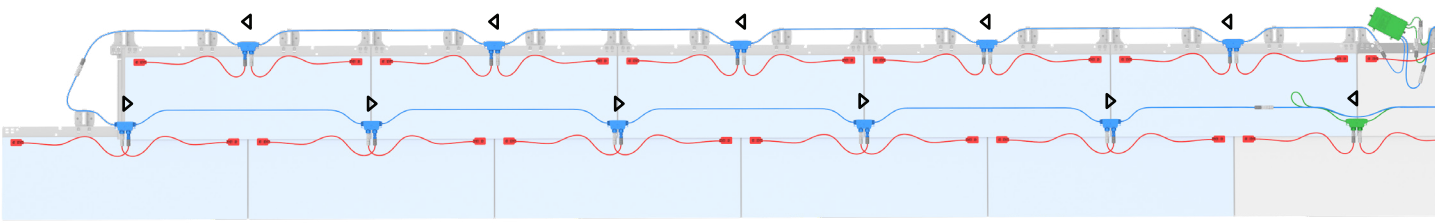
43

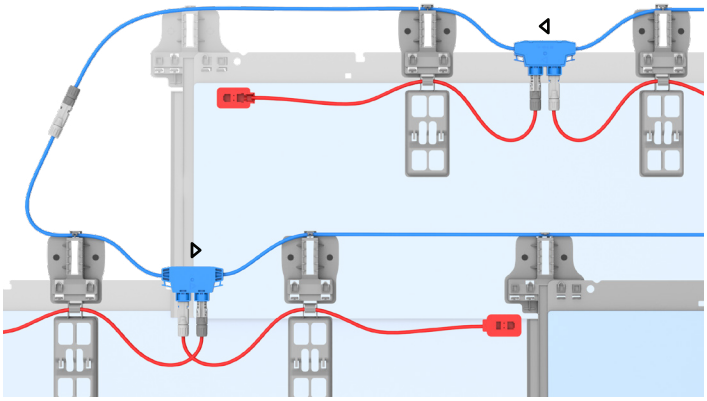
SERPENTINE WIRING SCHEMATIC

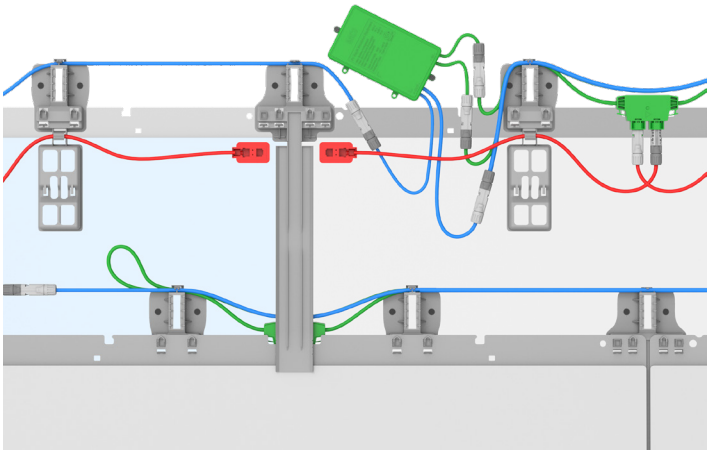
MCI OUTPUT ASSEMBLY

Connect 10 or fewer Solar Roof PV Modules between MCIs.









The output wire will wrap up to the next row. The module leads on the subsequent row will be reversed to connect to the Diode.

If not pre-assembled, connect the positive (female) and negative (male) input leads into the MCI. Connect the negative (female) output lead to the MCI.

STRING TESTING PROCEDURE

Solar Roof installation requires course by course testing and verification, of all strings, to ensure that all modules are connected properly and also that all modules are producing as designed. This testing is critical as any diagnostics and/or remediation of underperforming or miss-installed systems is challenging and time consuming.

- The data tested/collected is the Open Circuit Voltage (Voc) of the PV Modules when installed in series.
- When installed in series the Voc of these modules measure in a cumulative function.
- This number is representative of the nominal Voltage of the modules (13.34) multiplied by the number of modules.
- During the course of the installation ambient conditions may change depending on temperature and cloud cover being the biggest factors. Take a test reading from one PV module at beginning of population, after a break, or any big change in sunlight.

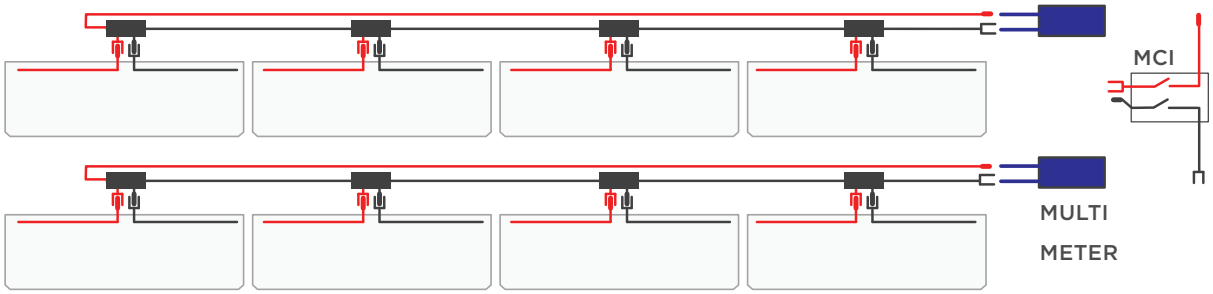
End of job verification requires submittal of the string level testing to the BOLT platform (JCO) to ensure this information is available through the lifetime of the system. Additionally, notations confirming that stringing as designed matches the string as installed are a requirements.

1. Voc is checked by plugging in to both ends of the circuit. *Note: This may be challenging due to split arrays.* Test each 10 x and MCI 5 x rows as you go. Typically, this happens at each completed diode section from the homerun or bypass section.
2. Verify that the Voc has jumped by the correct amount (# Modules x ~Voc).
   Voc should increase to the relative control value multiplied by the number of modules in the row.
3. Record values on Voc sheet for each string. Writing down the size of the row helps find inconsistencies or issues that might arise with the diodes or wiring.
4. Always get a picture of the final Voc for the string.
   This information is required as part of the job close out portion.

VOC TESTING

CURRENT PROCESS – NO MCI BYPASS UNIT

If no Bypass Unit is available the course by course testing is conducted just after the diodes are plugged into the modules, but BEFORE they are connected to the rest of the string. Utilize a multi-meter to determine output and record on the Voc Checklist. Extra care needs to be taken to ensure that connections made to the surrounding Diode Trunks are correct. This method generates a Voc count ONLY for the tiles in that subsection. This could read across mutiples courses of PV tiles.

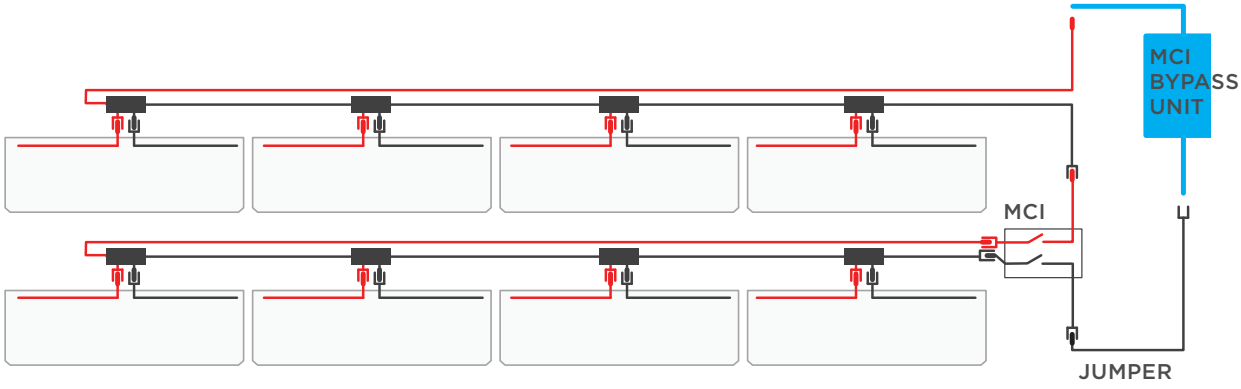


CURRENT PROCESS – MCI BYPASS UNIT

Mid-Circuit Interrupters effectively block the flow of energy when in shut-off mode preventing the capture of string level Voc. The MCI Bypass Unit solves this issue by sending enough power to the MCIs to activate them, allowing current to flow normally.

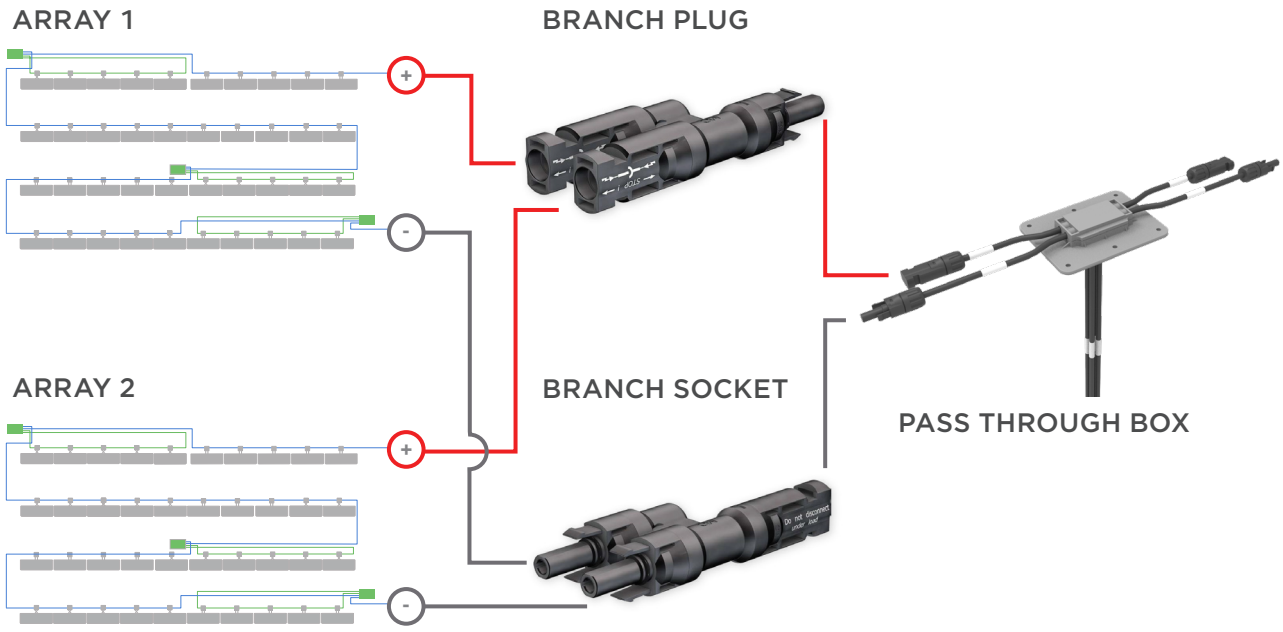
As the array is installed ensure that the low end jumper remains exposed and travels up the mounting plane along with the installation, this jumper will be used as one end of the circuit and will need to plug in to the MCI Bypass Unit.

Complete the circuit by connecting to the modules below and the bypass unit. As long as the unit power source is charged the string will now be powered. Utilize a multi-meter to determine output and record on the Voc Checklist. Also, ensure that the diodes have either a PV module or bypass jumper in them before testing a completed row.



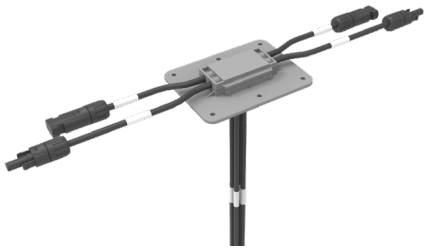
BRANCH SOCKET AND PLUG

Branch Sockets and Branch Plugs are used to make parallel connections between PV strings before entering a Pass Through Box. These connectors are installed on the roofing surface under the modules.



PASS THROUGH BOX

Verify transition location on plan set. Install Pass Through Box using wiring methods and materials that comply with Article 690 and Chapter 3 of the NEC and local regulations.



Disengage Uplift Clips in the tile by gently prying the tile up using a door lifter (tile removal tool). Push the tile uproof to disengage the uproof hooks from the feet, then slide the tile downroof and out of the array.